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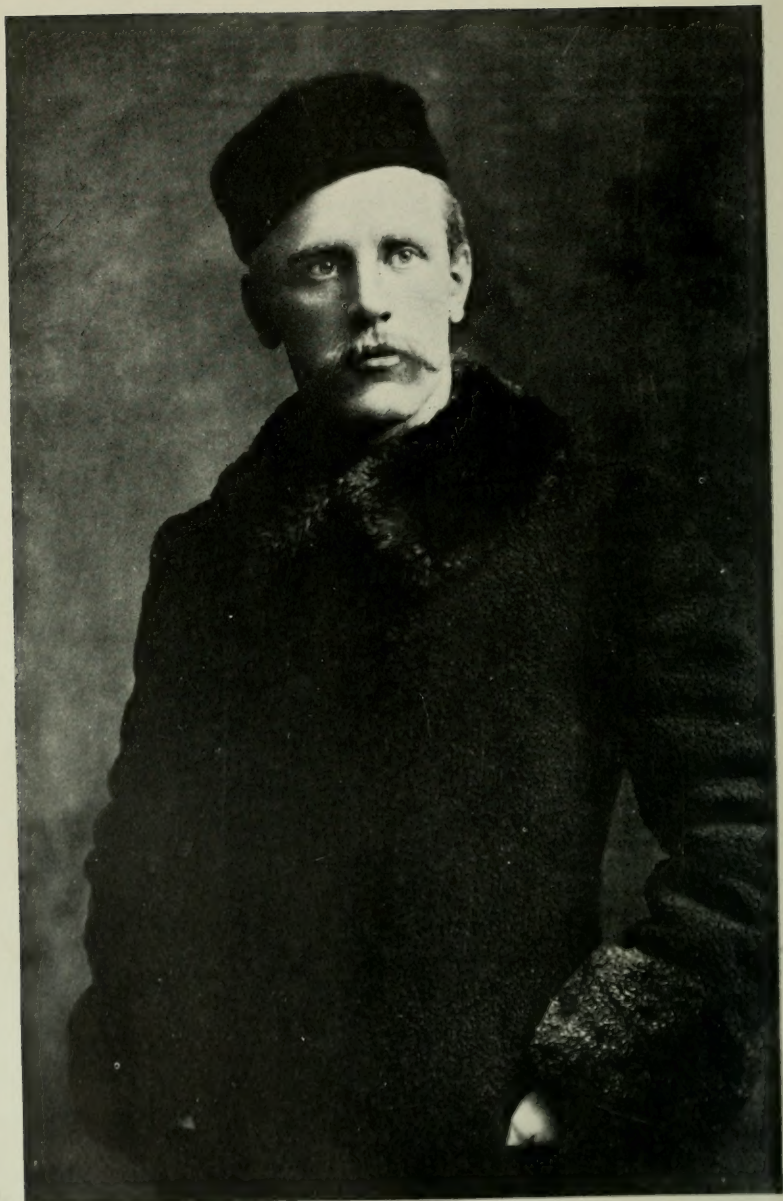
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HUNTING AND ADVENTURE
IN THE ARCTIC



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FRIDTJOF NANSEN

From a photograph taken at about the period of this voyage.

HUNTING AND ADVENTURE IN THE ARCTIC

BY
FRIDTJOF NANSEN

Fully Illustrated
From Drawings by the Author



NEW YORK
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1925

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Fridtjof Nansen from a photograph taken at about the period
of this voyage. *frontispiece*

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HUNTING AND ADVENTURE
IN THE ARCTIC

HUNTING AND ADVENTURE IN THE ARCTIC

I

NORTHWARD HO !

WHAT a wonderful fairy-tale of Nature is the Spring when we are young—this awakening of life after the long winter.

To see the earth emerge from the snow day by day, to drink in the scent of the soil and the bursting buds, to hear the joyous paeon of the rollicking spring streams.

And then the first blue anemones on the brown carpet of the wood, and the lark ascending into the cloudless sky; and the melody of thrushes and robins in the twilight.

But dearest of all is the graceful birch, smiling radiantly through her veil of misty green.

What an irreparable loss that the whole of one of these fairy-tales should be cut out of your young life. . . .

This was the thought uppermost in the mind of a

young man of twenty who stood on the deck of the "Viking" as she weighed anchor and steamed out of the port of Arendal early in the morning of Saturday, March 11th, 1882.

The sailor-men gave the sleeping town a hearty cheer. Here and there someone waved his hat, or a handkerchief fluttered from a half opened window.

The "Viking" sailed out of the sound past Torungen lighthouse just as the sun rose.

The youth gazed regretfully at the islands and the promontories and mountain ridges gilded by the sunbeams. . . .

It would be the first spring that he had not rowed in and out among the little islands and skerries to welcome the birds returning northward, the first time that he had not heard the "bubbling" of the black cock and the cuckoo calling in the depth of the forest.

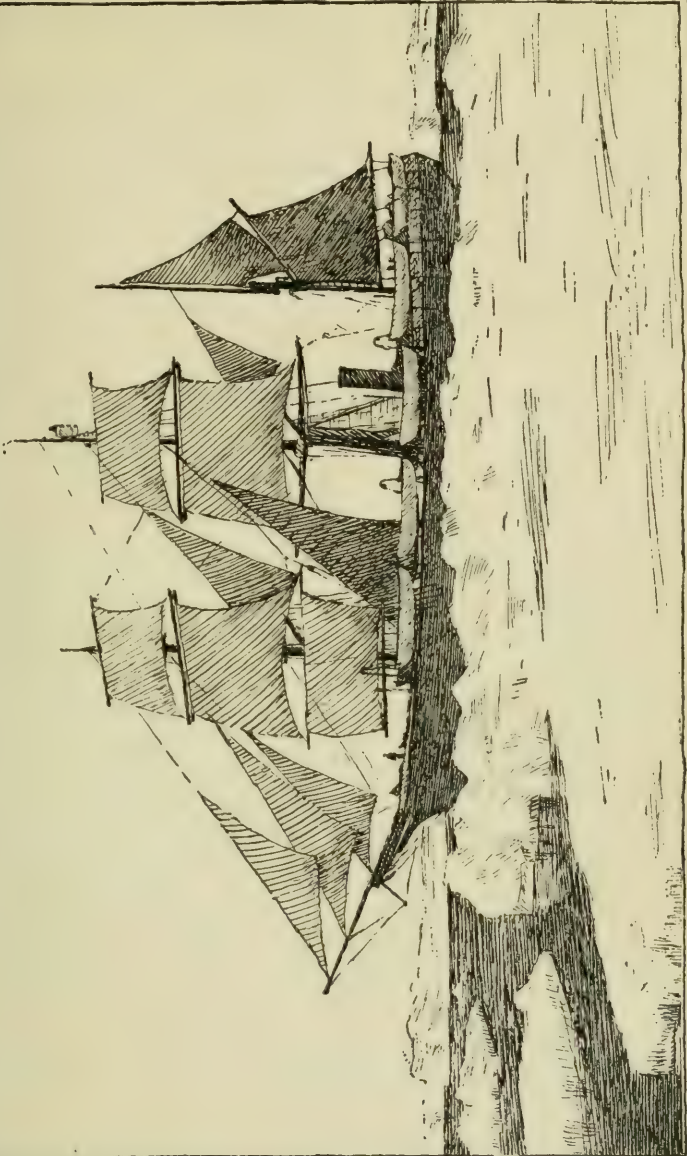
It seemed to make his heart bleed.

But now a new and even greater adventure was luring him on: the sea, and away in the far north a world of ice.

He, like the "Viking," was starting on his first expedition to the Arctic Ocean.

After much hesitation he had finally decided to study zoology. Why? Well, chiefly because he happened to be an enthusiastic hunter and fisherman, a woodsman, and in his youthful inexperience he thought that the study of zoology would mean a life in the open air, which was not the case with physics and chemistry, though they attracted him more.

Then one day he had suddenly taken it into his head



The Arendal sealer "Viking."

that he would begin his study of zoology by studying the animal life and physical features of the Arctic Ocean.

Why he wanted to test his youthful powers up there in the north he had no very clear idea; but doubtless he was mainly attracted by the prospect of hunting and adventure. His scientific attainments were not of a particularly high order, but at any rate he had done a good deal of shooting and hunting.

He had made enquiries about the sealers, and had heard that an enterprising young captain named Axel Krefting had the reputation of being one of the ablest and most successful, but also one of the most reckless of the Arctic skippers. He had immediately got into communication with this skipper. Yes, Krefting was quite willing to take the young man with him; but as he had just been placed in command of a new boat from Arendal it would be necessary to obtain leave from Smith & Thommesen, the owners. Through an old friend of the family living at Arendal an application was made to the owners of the vessel, and a telegram came back by return giving their ready permission.

Thus it came about that the young man was sailing as a passenger on board the "Viking." He had a cabin aft, on the port side of the saloon; the captain's cabin was opposite on the starboard side.

Many a year has passed since that morning in March. The young fellow of twenty is now one of the "older generation" writing about bygone days. . . .

We were heading for the open sea. Our first

object was to get as quickly as possible to the ice in the waters near Jan Mayen, in order to find the young seals; for it is there that the Greenland Seal, or Saddle-back as it is called by the sealers, assembles by the hundred thousand on the drift-ice to bring forth its young.

We were rather late, for the other sealing vessels had left Norway a week or two before we started. We had to put on full steam and full sail to catch up; and we pounded along at a splendid rate.

With a fine day and a starlight evening we soon rounded the Naze and stood farther and farther out to sea.

On the following day there was still quite a light wind, but a fairly high sea, evidently due to a recent storm.

In the afternoon a wreck was sighted ahead of us, and I was on deck in a jiffy. We steered straight for it. Everybody was excited to see whether there were any people on the wreck; at one moment we thought we could see some, the next they would resolve themselves into stumps of masts or cowl.

At length we drew alongside of it. It turned out to be a deserted bark, with the name "Loyal, Grimstad," on the stern. Judging from what we could see through the open hatches and the damaged deck the cargo consisted of props.

The hull was leaking everywhere, and the water flowed in and out through its sides as it heaved up and down in the sea. Its cargo was keeping it afloat. The main and mizzen masts had gone by the board, but the foremast was still standing. The top-sail hung in

tatters from the top-sail yard. An oar lashed to the stump of the mizzen mast on the top of the cabin had evidently been used as a signal of distress. Two boats in good condition lay on the roof of the deck house forward, which seemed to show that the crew had been taken off by a ship or washed overboard by a heavy sea.

A wreck like that is an uncanny sight; you never know what sufferings it may have witnessed.

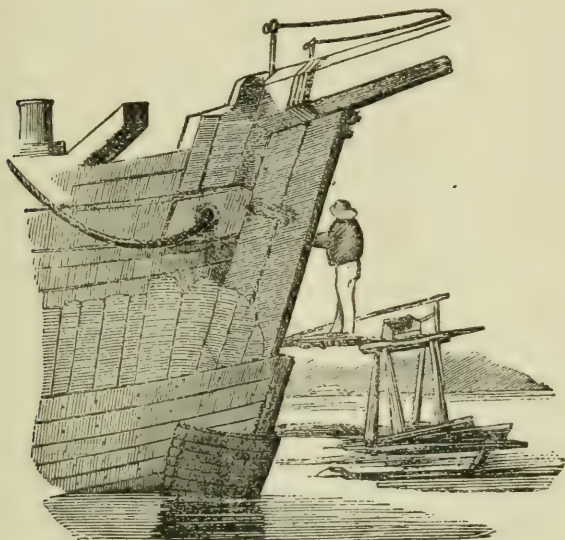
It was not worth while to waste precious time in towing it to Stavanger; we had to hurry on to the sealing grounds. The wind had freshened, so we crowded sail and gave the engine a rest, much to the satisfaction of the stokers, who were on their first trip and did not like the heavy swell and a temperature of over a hundred degrees in the engine room.

The "Viking" was a bark-rigged sealing vessel of about 620 gross tons register, with a 90 nominal horsepower auxiliary engine.

A sealing-vessel should be specially built with a view to navigation in drift-ice, and able to withstand the severe strain to which it may be subjected there. The ribs are set closer together and the timbers are generally thicker than is usual with ordinary sailing vessels, and the same is true of the cross-beams for the deck and between deck. The "Viking's" timbers were mainly of pine-wood, with oak in the bow; their thickness was about 9 inches at the top, increasing downward to about 20 inches near the keelson.

Outside the sheathing there is an extra "ice-sheathing," consisting of three-inch planks of green-heart

or hard oak extending from a considerable distance above the water-line to many feet below. The "Viking" had a double 4-inch sheathing of pine and an ice-sheathing of green-heart which was $4\frac{1}{2}$ inches thick forward and decreased aft to $2\frac{1}{2}$ inches.



Protecting the bow against the ice.
(From an old drawing.)

The ship's ability to force its way through the ice depends not only upon the power of the engine and the ease with which the vessel can be manœuvred, but also to a large extent upon the shape and strength of the bow. This should preferably be sloping and inclined outwards in such a manner that the boat when ramming the ice runs up on it and rides over it. If the bow is too vertical, the ship will easily get wedged between the floes, and it will be more difficult for her to force a passage through the ice.

Obviously the bow must be particularly strong. It should be built of several stout stem-pieces, fitted one behind another, and well stiffened by means of inner shorings, large oak knees and thick pitch-pine beams. The thickness of the wood in the bow of the "Viking" was about 6 feet. In front of this comes a solid iron stem, and across the bow—from well above the water-line to far down below it—heavy iron bands are clamped closely together, extending backwards on either side to a distance of several feet.

The most vulnerable part of a sealing vessel is the propeller, which is sometimes destroyed in thick ice, by striking against heavy pieces of ice. The more modern sealing steamers are therefore so constructed that the propeller can be changed in mid-ocean, should the necessity arise. The propeller is enclosed in a steel-frame, which can be detached from the shaft, and hauled up through the well of the propeller; and a new propeller can be fixed in the frame, and lowered down the well. A pivot in the forepart of the propeller fits into a socket at the end of the main shaft which causes the propeller-shaft to revolve when the frame is securely fixed in its place. The "Viking" was fitted with this kind of propeller-well.

It is often impossible to prevent the propeller from striking blocks of ice when the ship is navigating the ice-field. If the ice is large and heavy and the blade of the propeller strikes it hard, it is important for the blade not to be too strong, as this might cause the main-shaft to twist, bend, or break, and it is practically impossible to repair a shaft of this kind while at sea.

On the other hand the blades of the propeller must not bend, for in that case they might knock against the frame when revolving, and it would become impossible to fit a new propeller owing to the difficulty of drawing up the frame and the propeller together.

If anything, therefore, it is best for the blades of the propeller to be of medium strength, so that they may snap off rather than bend, without putting too great a strain upon the shaft.

On this account the propellers of sealing vessels are usually made of cast-iron. These propellers are somewhat thicker than steel propellers; they rather reduce the speed, but there is a better chance of being able to replace them.

The propellers have only two blades. When the ship is under sail and the auxiliary engine is not in use, the propeller is placed with its blades up perpendicularly in the well, in such a manner that they are protected by the body-post; here they interfere as little as possible with the way and are out of reach of the ice.

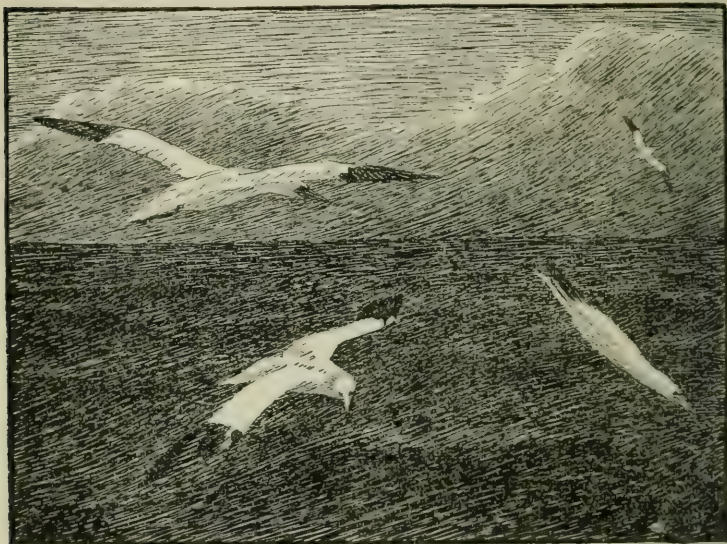
The "Viking" was a new ship, as I have said; and she had been fitted with a more powerful engine than the other Norwegian sealing vessels.

In view of the sealing these ships always carry a large crew; on the "Viking" there were 62 men, including the captain and passenger.

The wind continued favorable for several days, and we hoisted every stitch of canvas that would draw.

Sea, nothing but sea, with long combing rollers. So this was "the free, the mighty ocean." Mighty it

undoubtedly was, and overwhelming in its infinite monotony. But what about freedom? How gladly one would admire, and be uplifted by the salt freshness of the vasty deep, if these interminable, pitilessly rolling mountains of water did not make one feel so horribly seasick!



Gannets.

I was standing on deck watching a school of dolphins (*Lagenorhynchus acutus*) which had been swimming beside us for a long time. How enviably at home they seemed as they buffeted with the waves and shot on past the ship with lightning speed; one after another they would emerge and then dive down under the crests of the waves, leaving a glittering track of blueish green where they disappeared. Ah, *they* had no unpleasant sensations to fight down!

And behind us, over the wake of the vessel, the kittiwakes followed faithfully with their easy graceful flight, their white breasts, blue backs and black-tipped wings; one young bird had also a black tip to his tail and a black band across his back, reaching right out to the tips of his wings.

Whenever anything was thrown overboard they fluttered, sped down with the swiftness of an arrow upon our wake, and were left behind for a little while. But soon they would return again, soaring with motionless wings, sometimes on a level with the mizzen mast head, and sometimes on a level with us as we stood on the half-deck. Guillemots and rotches would now and then dart past the ship with rapid wing-beats, or ride on the surface of the sea.

Farther away a big gannet (*Sula basana*) was hovering aslant upon long, stiff wings above the waves.

On the night of the fourth day (*Tuesday, March 14th*) the wind rose to a howling gale from the southwest. The sea rose and dashed over the ship everywhere until there was no longer a dry place to be seen on the deck or the half-deck aft.

As I lay in my bunk reading in the morning, I heard a crash followed by shouting and confusion on deck. I threw on some clothes and went out to see what it was. The main yard had broken under the heavy press of sail. Krefting liked to carry a lot of canvas. The crew were just engaged in salving the broken pieces of the yard.

It was an exhilarating sight: The huge blueish green mountains of water with white foaming crests

which came hurtling in upon us and washed over the deck, while the unconcerned seamen in their sea-boots and oilskins worked away calmly at the yard as though it was quite an everyday occurrence. And a new visitor had turned up. The fulmar, or malle-muck, had come to join us. For long stretches at a time they sailed with outstretched wings along the sea-surface over the wave-crests and down in the hollows, keeping to the same low level above the water; then they would swing round and upward, giving a few noiseless wing-beats, then go soaring off, then round again, sailing onward with outstretched wings along the surface of the water, always in motion, never at rest. The storm is their element—silently, noiselessly they come from another world, bringing a first greeting from the north to the seafarer as he enters the Arctic Ocean.

However much it might go against the grain, the captain had to shorten sail now if we did not want to lose the boats and have the skylights smashed by the waves. The ship was tossing violently in the heavy seas.

But she swept on gallantly northward through the seething tumult of foam.

On every side one saw nothing but a waste of heaving, blue-grey waters, huge mountains with snow-capped summits rising, falling, rolling onward in endless succession across the vast blueish white plain. Scudding clouds chased each other over the low, leaden sky.

Ridge after ridge came rolling up, towered and broke in a white smother of foam, and rolled on. Goaded by

the resistance of the ship they would pause for a moment, raise their crests—showing a glimpse of beautiful dark green underneath as they topple over—and then launch themselves against the dark hull in a cataract of green and white water.

Here is the battle-ground where for thousands of years generation after generation of our forefathers have carried on the same warfare against the mighty and incalculable moods of this primeval power, and have established our nation's right to exist.

But the sea, heedless of courage and cowardice alike, rolls on with an eternal rhythm through times past and times to come, until the day when, thousands of millions of years hence, it shall lie rigid in the everlasting frost.

As the evening wore on the gale increased in force and veered round to the west, while the sea became rougher.

The night was inky black. Out of the darkness on the windward side the hissing white crests of great seas rose, broke, and poured in over the bulwark with a thunderous roar; glittering phosphorescent cataracts swept across the deck, and the spray flew up like a jet of sparks, as we thrashed along into the black unknown.

We were standing aft on the half-deck; suddenly the captain, who was at my side, shouted "Look out!"

I caught a glimpse of something dark above me to windward and had only just time to clutch the mizzen shrouds before a big sea broke on the deck and lifted

us clean off our feet so that we hung by our arms from the shrouds.

It swept on over the sky-light and towards the men at the wheel.

The captain had just time to yell: "Let go the wheel!" The lee steersman jumped for the lee-boat, which was hanging in the davits, and the windward steersman clung on to the nearest support as well as he could, while the wheel spun round protesting shrilly.

If he had tried to hold it he would probably have been hurled to the deck like a lump of meat. And it was lucky for the man on the lee side that the wave which swamped the boat, did not carry it away.

When the captain swore at him for his lack of sense he only laughed.

This was quite a new sort of existence for a young and inexperienced mind. It was the life dear to roving spirits, from the Viking to the seamen and sealers of today. Smiling, reckless courage amid the storm and the raging seas.

On the fifth day (*March 15th*) a stiff gale was still blowing; the seas continued to wash over the bow and amidships, but on the half-deck aft one could keep fairly dry.

I stood looking out over the undulating plain with its endless lines of wild white horses with tossing manes, and watched the interminable rollers surging up from the west, rising, towering high, breaking into white crests, sinking down, rising again, without rest and without pause; or curving in over the windward bulwark, to sweep in a green and white cataract right



Axel Krefting, master of the "Viking."

across to the lee side of the deck. The heavy masses of water would wash backwards and forwards with the rolling of the ship, carrying away every loose object, until they escaped through the wash ports. Then a fresh wave would break over the ship.

The cook's mate came out of the door in the front part of the half-deck; he had been aft to the steward to get some provisions for the cook, and had both arms full. He stood there a moment, waiting until the worst of the water from the last wave had run off.

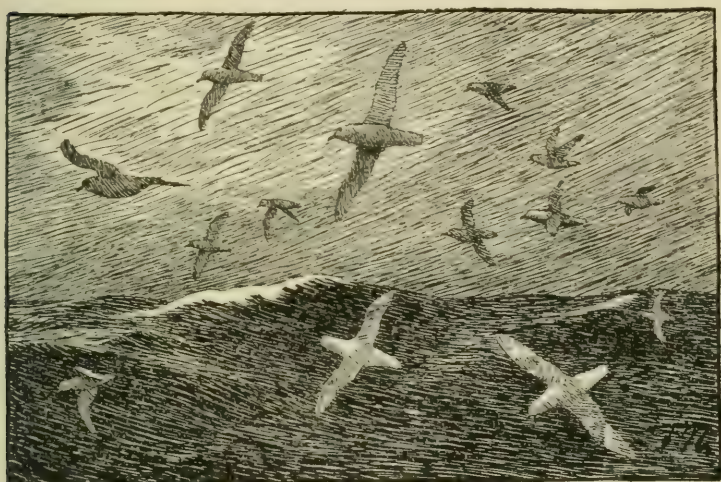
Then he sprinted along the deck to reach the forward hatchway before another wave came; but a fresh sea rose and broke over the deck. He ran for his life towards the foremast but was knocked over and carried along by the inrush of water, rolling over and over like a bundle of clothes until he reached the lee side, while he strove heroically to hold on to the remains of his precious burden. The sailors roared with laughter. Finally he came to anchor against the lee bulwark, struggled to his feet and tried to save some biscuits which were swimming about in the water. He looked like a drenched crow as he hopped about and kept on being knocked down again.

Behind us in the wake of the vessel there was frantic excitement and noise among the malle-mucks, which had pounced upon and were fighting furiously over the lost provisions that had been washed out through the clearing ports.

More and more malle-mucks had assembled. Several guillemots would hurry swiftly past us now and

then; they had a busy time in this boisterous weather. The kittiwakes were no longer so numerous.

On the seventh day (*Thursday, March 16th*; air temperature 25°) a little snow began to fall. The wind had dropped and gone round to the north, right against us. We got up steam in the morning, and steamed all that day.



Arctic Fulmars or Mallems.

The kittiwakes had now disappeared altogether; we could only see mallems of all shades, from the old birds with white breasts and grey backs to the young ones which were entirely grey.

The mallems (*Fulmarus glacialis*) belongs to the ocean-flyers, and is of the same family (*Procellariidae*) as the albatross.

Incessantly and untiringly they sailed round us with their noiseless flight, and one never saw them at rest. To the inquiring mind of the young naturalist their

flight presented a new problem over which he pondered again and again. That a bird could glide with motionless wings and without moving a muscle seemed to be at variance with all the laws of physics he had learnt. On and on they went, even increasing their pace, and so far from sinking they would actually rise. It was contrary to the law of gravity! He could not solve the problem.

In later years I have come to the conclusion that this bird's power of soaring with motionless wings is due to its being closely acquainted with the ascending air-currents.

When air passes over an uneven land surface or over the surface of water which is rendered uneven by waves, vortices are formed, with currents of air which ascend and descend. The amount of air which descends is equal to the amount which ascends; but the air is driven upwards in these vortices with greater velocity than the falling air, and has consequently what in physics is termed a greater degree of kinetic energy. Thus it is not only capable of supporting a hovering bird which knows how to take advantage of it, but may even carry the bird forward, because the latter places its wings in a position that allows it constantly to glide, so to speak, along this ascending air. As far as I can make out, this must also be the explanation of the mallemuck's flight along the sea surface across the crests and down in the troughs of the waves. By carefully watching these birds and the kittiwakes as they fly alongside of a ship one may also notice that there are certain places where they find it particularly

easy to keep on soaring; these are just the places where strong ascending air-currents probably exist, for instance to windward of the vessel, whereas in other places, for instance under the lee of the hull, the birds are certain to make use of their wings.

The chief event at this time, as far as I was concerned, was one which is commemorated by the following entry in my diary for the seventh day of the voyage: "Every trace of seasickness vanished. Thoroughly enjoying life." I celebrated the occasion by sitting up until three o'clock in the morning and smoking Dutch tobacco in a long pipe while I read a German story of adventure.

Next day (*March 17th*) we steamed on in the same sort of weather. The temperature was rather lower, being nine degrees of frost in the morning; but we were still in warm Atlantic water with a surface temperature of 41° .

In the afternoon we were in Lat. $65^{\circ} 55' N.$ and Long. $1^{\circ} 14' W.$, which is about the same latitude as the north of Iceland. We saw great numbers of malle-mucks, but practically no other living creatures.

One feature of these days was a sale which was held for the benefit of the crew. Many of them had come on board with hardly any clothes or other necessities except those they were standing up in. Of course they had been given an advance to pay for their outfit before they left, but they had gone on a spree and spent it all; they were a wild lot as long as they were ashore. Consequently they had now to buy whatever they need-

ed most from the stores that had been taken on board with a view to this contingency.

On the first day we held a sale of clothing, jerseys (vulgarly known as "Lousifers"), woolen garments, canvas for overalls, seaboots, and so on. The sailors came in turn, made their selection and took away what they wanted. A list was kept, and the price of the goods was afterwards deducted from their pay. On the succeeding day there was a similar sale of tobacco, soap, and boot-leather.

These were preparations for the new life of adventure that lay ahead in the ice and the cold, so I watched them with profound interest. The preparations for hunting and fishing expeditions constitute a sort of prelude of expectancy which is part of the enjoyment of it all. They gave me a foretaste of what was to come.

I decided that I must have canvas overalls too, and the sailmaker made them for me. They were intended not so much to keep out the cold as to protect one's clothes from being soiled by blubber and splashes of blood, and this had a flavor of hunting and adventure.

For the rest, life on board had begun to settle down. I have mentioned already that these vessels carry a large crew for the sake of the seal-hunting, and that we were 62 all told. The captain, the two mates, the engineer, the steward, and the passenger had their cabins aft under the half-deck. The remainder of the crew numbering about 50 hands, occupied the roomy fore-castle, where they slept in two rows of bunks placed above each other along either side.

Without counting the so-called day-men who did not belong to the regular watch on deck, such as the cook and cook's mate, the carpenter, sail-maker, boat-swain etc., there were still a good many more left for the deck-watch, which was changed every four hours in the usual way, than were needed to work the ship, handle the sails, and act as look-out men and steersmen.

Consequently the life on board these vessels is generally a lazy one when there is no sealing going on, and it is difficult to keep the hands employed.

When it was cold and uncomfortable on deck they would often slink away down into the crew's cabin, where they would sit smoking and spinning yarns, or fried "dunderfunk" in the galley. It gave the captain and mates a lot of trouble to find them and drive them up on deck again, and when they were discovered down below warm work would often ensue, not only with winged words but with even more striking arguments.

As the "Viking" was a new ship there was a good deal of boatswain's and ordinary seaman's work to be done, and this kept a good many of the crew employed, at any rate for the time being. They plaited sennit, wove chafing-mats and other mats, rigged up blocks, spliced straps, and so on. The carpenter and joiner had enough work to do making gratings and other small fitments of various kinds.

There is a story of another Arctic skipper of those days who hit upon a good way of utilizing the leisure time of his crew. He had built himself a house, and

when he left home he took with him on board materials for all manner of joinery for this house—doors, open-work carvings for balconies and such like. He mustered as many men with a knowledge of carpentry as he could find among the crew, and all through the voyage when they were not actually seal-hunting, he kept them working for his house at home in Sandefjord, which to this day bears visible witness, by the profusion of open-work decoration on its balconies, to the “home industry” of the Arctic.

The chief excitement on board was setting the topsails. These Arctic Sea craft, being manned by such a large crew, usually have simple, patent-reefed topsails which can be set from the deck, and demand strength rather than seamanship. The topsail hal-yard is stretched along the deck and the whole watch lay hold of it. As many as twenty men in line haul at the rope to the tune of some such chanty as the favorite:

“And who could lead the dance so well

As pretty Mistress Hansen?

Tra-la-la-la, tra-la-la-la, tra-la-la-la, ahoy!”

They tramp briskly and in time along the deck while the topsails are stretched. But when the topgallant sails are being set, some of the hands have to go aloft to cast loose.

When the watch is changed there is a perfect pandemonium in the forecabin. The watch below is roused by frightful, long-drawn howls which would make a novice suppose that something terrible was hap-

pening. The sleepy seamen turn out of their bunks and tumble into their clothes, and all is bustle and noise in the crowded space forward. Next comes mess. The cook has the food all ready in the galley, and it is served out. There is no lack of food, and the men live well; but with the lazy life and so much food they are apt to fill out more and more on a trip like this.

The time never hung heavy on my hands, for there was always so much to see and learn in this novel sailor's life. Of an evening it was unspeakably delightful to leave the cold and darkness on deck and go down to the bright cosy cabin where a warm supper awaited us. While the captain and I enjoyed our sociable meal I would follow with avidity all his tales of the sealing and the life in the far north, and when the mates and the steward came in I listened to their talk about all that had happened in other years, to their descriptions of the various ships and their captains, and most of all to what they said about the sealing prospects.

At last on the eighth day (*Saturday, March 18th*), the great event happened. At 8 o'clock in the morning the temperature of the water had fallen to 35.6° . At noon we were in Lat. $68^{\circ} 16' N.$ and Long. $4^{\circ} 43' W.$ The ice could not be far distant now.

Towards evening the first ice was sighted. I was up on deck in an instant, but at first it was too dark for me to distinguish anything. Then something white emerged from the blackness. It grew larger and larger, and gleamed still more white against a background black as night; this, the first piece of ice, had

come from the boundless ice-fields which, as I knew, stretched away northward in the Polar night beneath the stars and the northern lights. A thrill went through me. What was it that moved me so strangely? After all I had seen plenty of equally large ice-floes, and there was nothing remarkable about this one. But it meant that we were on the threshold of a new and unknown world, irradiated with all the imagination and love of adventure of a youthful mind.

Another floe—several of them! Glimmering white they swung out of the darkness in front; they slid past us with a lapping, grinding sound as they rocked in the sea; then glimmering white they faded away in the darkness astern. Now and then a tremor passed through the ship as she knocked against a block of ice.

But what was this strange grinding, rushing sound away to the north? And this uncanny light? I noticed it now for the first time. The sky in the south was veiled by sombre clouds; but in the north this veil was illuminated from below by a white shimmering glow which stretched from the north right across to the west. Though it was brightest down by the horizon, it was visible up to the zenith.

This was the reflection of the white ice-fields upon the banks of clouds above them; and the sound I heard was the surf beating against the edge of the ice, and the floes grinding against one another in the swell.

I could not see any more yet, but we were drawing steadily nearer. The light became stronger and we saw more and more ice-floes drifting in the sea around us. Occasionally the ship collided with one of the

larger floes, which her strong bow thrust down and hurled aside. At times the shocks were so violent that the whole ship shuddered, jerking one a step or two forward on the deck. We were in for a new experience, and no mistake.

I had read a great deal about this world of ice and had formed many a mental picture of its appearance and the first meeting with it—but nothing like the reality as I saw it now. Even the weirdest shapes with towering spires of ice, as portrayed in the most exaggerated narratives of voyagers could hardly vie with the impression produced by this uncanny light in the north, and the ghostly grinding noise, and the single ice-floes drifting on the surface of the inky water. And by and bye I saw the northern lights playing over the sky behind the gradually dispersing veil of clouds.

The captain would not go into the ice at night, so we sailed along the edge in a north-easterly direction; but continual shocks reminded me, as I sat reading in the cabin, that the ice was not far away.

When I turned out next morning, which was Sunday, March the 19th, we were already in the ice (in $69^{\circ} 52' \text{ N.}$, and $4^{\circ} 50' \text{ W.}$).

What a wonderful sight met my eyes! The ice-fields spread out on all sides, dazzling white and covered with snow. Not a single dark patch could be seen; it was all so white that one could scarcely bear to look at it, but had to screw up one's eyes and take alternate peeps with them. Overhead stretched a winter sky of pale, cloudless blue.

After the eyes grew accustomed to the blinding glare

one could distinguish rifts in the ice; but they were so close together that at first sight and from a little distance they looked like an unbroken surface.

But look! Some white birds came sailing along—birds of the most snowy whiteness and of some larger size than the kittiwake. I thought them one of the love-



Ivory gulls.

liest sights I had ever seen as they hovered in the blue sky with the sunlight shining on them. It was my first glimpse of the ivory gull (*Pagophila eburnea*); I saw plenty of them afterwards. The plumage of the full-grown bird is quite white without a single dark feather. The only parts that are dark are the feet and eyes, which are black, and the beak, which is also of a blackish hue. Its eyes are surrounded by a wonderful ring of carmine-red which is only visible close

up, but which enhances the beauty of the bird. The young bird's plumage is covered with black spots during the first year of its life; as the bird grows up these spots gradually disappear.

The English name for this bird—the ivory gull—is very descriptive, but its Norwegian name, the “ice-gull” is scarcely less appropriate, for it is essentially the bird of the ice. Not only has it whiter plumage than all other birds, but it stands out as the typical denizen of the ice, unless it is rivalled by Rosi's gull; the latter, however, is so very rare.

The ivory gull is hardly ever seen outside the Arctic regions, but within these regions it is met with almost everywhere. On the “Fram” expedition we found it in summer distributed all over the Arctic Ocean as far north as 85° N., and occasionally it makes its way even farther north than that. It ranges about, sometimes alone, at other times in small or large flocks; no sooner have you brought down a bear, a seal, or a walrus on the ice, than you hear its harsh scream above you; it swoops straight down upon the carcass, and without further ado begins to peck at it. If you happen to be standing close by, or are engaged in skinning the animal, it alights on the ice beside you, and before long there is quite an assemblage waiting impatiently for the moment when you will move on and leave the carcass to them. If they have to wait too long for this, they will come close up and even begin to peck at the carcass while you are at work on the other side. Many a time, indeed, they have actually stood between my feet while I was skinning some animal, and snapped

up bits of blubber and flesh that fell from my skinning knife.

Nature sometimes disappoints us sadly. Who, when first seeing this beautiful bird, would guess that it was such a greedy and importunate carrion-bird, worse even than the vultures of the desert? As you watch its flight against the blue of the sky you experience a certain sense of the harmony and innocence embodied in that pure whiteness, which is so perfectly in accordance with the world around; but your dream is rudely shattered when the bird suddenly utters his hoarse, angry screech, and swoops down on the ice to gorge itself on meat and blubber.

For the greater part of the year the ivory gull lives on crustacea and other creatures which it finds on the surface of the water between the ice-flows. But whenever it gets the chance it will soon make short work of any blubber, flesh, or blood left over from the prey of bears, foxes, or men.

I cannot exactly say why it has assumed its white plumage. According to the most natural hypothesis this would be for protection against its enemies, which could not easily see it against the ice; but it has not got many enemies. The more important of these are the fox, which probably molests it chiefly on its hatching-places, and the glaucous gull, which may take its young; and possibly a stray falcon or snowy owl, though that would be seldom.

Its breeding grounds are situated far up in the Arctic Ocean, usually on low, solitary islands or spits, and sometimes on ledges along the steep sides of higher

cliffs. It lays a few eggs in a very primitive nest, generally a little mound of moss. Not very many of their breeding-grounds are known. There are some on the north-east coast of Spitzbergen and the islands lying to the east, especially King Charles' Land. One or two breeding-grounds are to be found on Franz Josef's Land, and also on northern Greenland, Grinnel Land, and the Parry Islands.

The mallemites and kittiwakes, which had now reappeared again, were in constant motion, hovering to and fro over the ice. On the open water between the floes swam little flocks of guillemots and roches, and here and there a solitary dovekie. These birds all hail from the bird-cliffs on Jan Mayen, on the east coast of Greenland, Spitzbergen, and Bear Island, where thousands and thousands of them hatch their young on the ledges of the precipitous cliffs. From these breeding-grounds they set out every few days and fly hundreds of kilometres right out to sea to look for their food, mainly consisting of crustacea, in the open lanes in the ice or the water between the ice-floes at the extreme edge of the drift-ice. When they have eaten all they want, they rise flock by flock straight into the air and fly in a bee-line back to their respective cliffs. Knowing the exact direction, they fly home at a tremendous rate. Up above all the rest fly the flocks of little roches, at such a height that one can only just see them, though the whirr of their rapid flight is audible at a great distance.

I also saw one or two snow-buntings, which came flying merrily along with their characteristic jerky

flight, alighted on the ice-floes close to the ship, hopped across the snow, and darted away again. They seemed to be just as cheery and pleased with life as the sparrows that hop about in the farmyard at home, though they must have got lost far away from their native region, unless they were migrating to the east coast of Greenland.

Everything had now to be prepared as quickly as possible for navigating the ice in search of the seals.

With the help of wooden splints and cables we had stiffened and lashed our broken mainyard and had hoisted it into position on the Sunday. In the evening the crow's nest was made fast to the maintop.

This crow's nest is the important part of a sealing vessel, where the look-out man stands to see where the ship may most easily be navigated in open water through the ice, and scans the drifting ice-fields through a long telescope looking for seals or, what comes to the same thing, for other vessels which appear to be engaged in hunting them. It is from the crow's nest that the movements of the ship and its boats are directed both during the navigation of the ice and the actual sealing; so it might be termed the brain of the ship.

When seals are in sight, or anything specially important is going on, the captain prefers to be up in the crow's nest himself; and he will stay there continuously for watch after watch. As a rule the only others on board who are sufficiently experienced in using the telescope to be entrusted with the responsible duty

of keeping a lookout from the crow's nest are the two mates.

It is about five feet high and wide enough for two men to stand in it at a pinch. At the back of the mast a Jacob's ladder leads from the top up to the crow's nest, which has a trap-door in the bottom through which one can climb into it. Inside the crow's nest is a little seat for the look-out man to sit on. At the top there is a sail-cloth screen which can be pulled along the upper edge of the crow's nest to protect one's head from the keen wind. By means of these devices one can make oneself fairly cosy and warm up there. The edge of the crow's nest is fitted with a wide iron ring as a sort of railing, upon which the telescope may conveniently be rested when in use.

Our veteran mate, Larsen, went about the deck shaking his head while the crow's nest was being hoisted into position. He had never heard of such folly as putting it up on a Sunday. "There'll never be any luck with that crow's nest," he assured us.

This man, with his venerable grey, shaggy beard, looked just like one's idea of a sealer of the old school. When he was younger he had acted as skipper up here in the Arctic, and had made many a successful trip. But he had a weakness for drinking spirits, as was often the case with the skippers of his generation. One year his ship drifted in among the young seals while he was lying dead drunk on the floor of the cabin; and there he continued to lie while his crew went out on to the ice and caught the seals. After that incident he could not get another ship, so now he sailed as Kreft-

ing's mate. Spirits, piety, and superstition often went hand in hand in the lives of these old-fashioned sailors.

The ice was fairly new, for the floes were hardly two feet thick and lay sufficiently far apart to allow us to force our way northward without other power than the wind in our sails. Eventually, however, the ice became too heavy. We had to change our course and remain stationary for the night while we got up steam. As soon as day broke we decided to shape our course for the east at full speed.

Our intention was to steam in a northerly and northeasterly direction along the edge of the ice, or if possible some distance inside it, and look for seals or the sealing-grounds, as they are called.

In order to enable the reader to form a clearer idea of what this search involves, and the way in which it is carried on, I will first describe the ice, showing how it is formed and how it drifts, and then the saddle-back seal.

II

DRIFT ICE AND THE POLAR CURRENT

OUR ideas regarding the origin, formation and course of drift ice were at that time, i.e. in 1882, still very defective. The voyage of the "Fram" in 1893-1896 was the main factor in giving us the more complete knowledge of its entire life history that we now possess.

It is formed on the surface in the Polar Sea and the Northern Arctic Sea. It is in constant drift over those waters, and later on melts in the sea. Large quantities of drift ice are borne away by wind and current from the sea north of Siberia, Bering Strait and Alaska, over the sea around the North Pole, and to the north of Franz Josef's Land and Spitzbergen. They then come south through the opening between Greenland and Spitzbergen, and borne by the East Greenland Polar current they drift past Jan Mayen, as a rule between the latter and the east coast of Greenland.

In these southern latitudes the temperature becomes too high for the ice during the summer, so that it melts more and more the farther it proceeds to the south. The stream of ice, therefore, becomes narrower by

degrees. It continues southward through Denmark Strait between Greenland and Iceland, where it meets the warmer water of the Atlantic. The Polar Current narrows, the masses of ice become smaller, and steadily diminish in width along the southern east coast of Greenland.

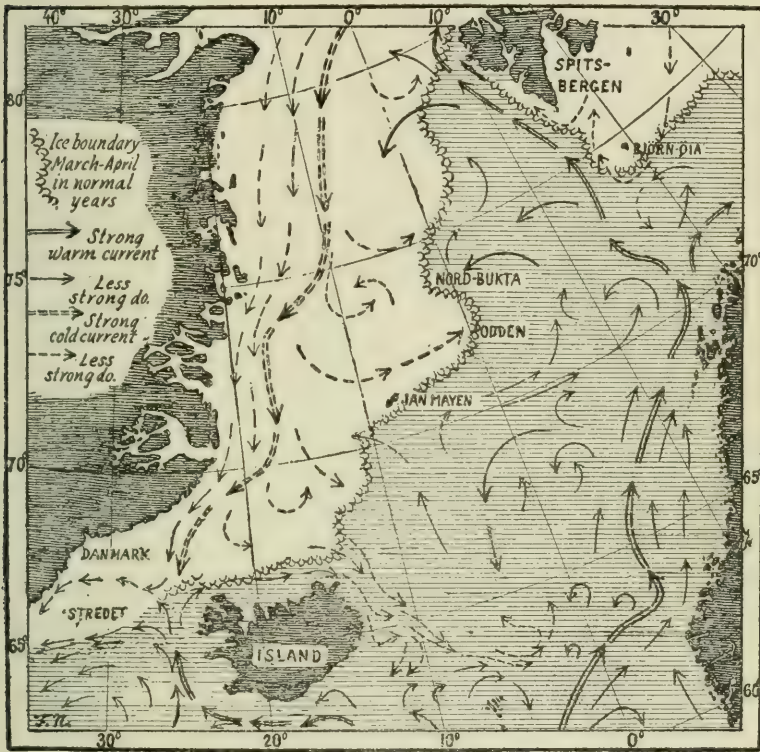
The last remnant of this drift ice bends round Cape Farewell, and to the west and north-west along the south-west coast of Greenland.

The masses of ice off the east coast of Greenland undergo during the course of the year surprisingly great changes in breadth and extent, especially in the northern part, in the sea between Spitzbergen and Iceland, where they have a wide extent, and stretch far to the east in the late winter and spring. This is due to the circumstance that in the course of the winter a great deal of new ice is formed over large parts of this sea, but in summer this ice melts again, as does also a great part of that which comes from the north, and the margin of the ice retires a long way toward the west.

During the whole of its long voyage, for five or six years, from the Siberian Sea and the regions north of Bering Strait and Alaska, to the southern point of Greenland, the drift ice undergoes constant changes. It is formed, grows, is broken up, is massed together by wind and current, it diminishes in size and finally disappears.

These masses of ice are formed out at sea, whether the latter be shallow or deep, and they do not to any appreciable extent, come from the land or from the sea near the coasts.

As regards ice-bergs, i.e. those originating in glaciers, there are practically none in the whole of the Polar Sea. They are first met with off the east coast of Greenland, where they enter the sea from the enormous glaciers that rise from the huge Inland Ice.



The currents in the Norwegian Sea and the normal distribution of the drift ice.

Some ice-bergs are also formed from the glaciers of Spitzbergen, Franz Josef's Land and Nova Zembla, but they are not large, and as a rule are not encountered outside the neighborhood of those

countries. They rarely join the ice masses in the East Greenland Polar Current.

There is also relatively speaking no large quantity of river ice in the Polar Sea. It is true that every summer large quantities of ice are carried out into the sea from the Siberian rivers, but these are quite small as compared with the immense tracts of Polar ice. In addition, a great deal of river ice melts in summer in the sea near the coast of Siberia, where there is then open water at a great distance from land.

When autumn approaches and the sun sinks lower in the heavens, the open parts of the sea in these northern regions become covered with ice. As by degrees the sun sinks, and darkness begins to fall upon those vast tracts of sea, and the long clear Polar night slowly deepens, the surface of this covering of ice constantly radiates heat into space, and the formation of ice rapidly augments. But the newly formed covering of ice on channels and open spaces is broken into pieces by wind and tide; and by violent pressure is jammed together and piled up into hummocks and ridges, whilst at other times or in other places large open spaces and channels like open lakes are formed in the ice. But this open water is soon covered again by thick new ice, which in the course of a day or a night may increase many centimeters in thickness, and after a few hours will bear a man.

This ice is again broken up and once more massed together. Open water is once more formed and this again is covered with ice, and the process thus

continues day after day, week after week, throughout the winter.

Sometimes there is a lull for long periods, and the new ice which is formed on the open spaces has time to grow thick and strong into huge surfaces that are not easily broken up when the pressure is resumed.

Whilst all this is going on the masses of ice are constantly drifting and zig-zagging as they slowly proceed month after month, year after year, across the Polar Sea.

In winter the drift snow is blown across the surface of the ice, and is collected by the rough surface of the ridges and hummocks, and little by little it is packed together by the wind and becomes hard. The snow thus helps to level out these ridges and hummocks, but as only a little snow falls in the cold Polar atmosphere, there is not sufficient to form a smooth covering, nor are snow storms very violent or frequent in the Polar seas. On the other hand, towards the periphery of the latter there may be heavier snowfalls and higher winds.

In summer the sun shines upon the surface of the ice and first melts the snow, and then large parts of the ice itself, especially of the ridges and hummocks, which thereby become smaller and more rounded.

On account, however, of the low temperature long retained by the ice in the deeper strata beneath the surface, new layers of ice are still formed on the under surface and this may continue into the summer. Early in autumn the temperature again falls, the melting on the surface ceases and the cold begins to penetrate the

ice, which in the course of the winter again increases in thickness.

Wind and current still act continuously upon the ice, break it into large floes and pile them up in heaps. Fresh spaces and channels of open water are formed, and these again are frozen over, and the process thus continues winter after winter.

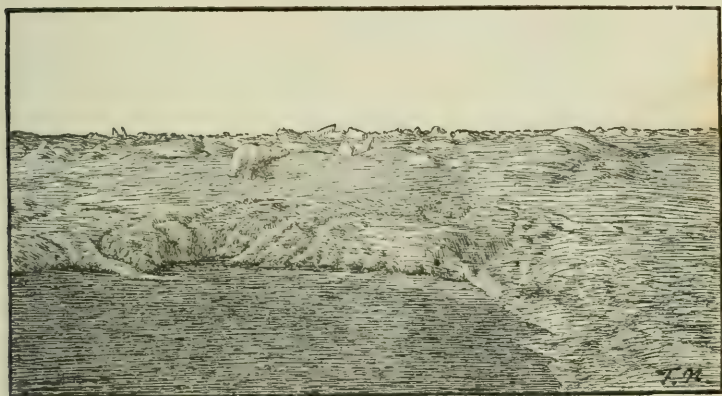
It is generally believed, even by eminent scientists, that the melting of the ice is mainly due to heat that comes from the underlying water.

That this is a misunderstanding may be seen from the mere fact that the ice in southern latitudes also, e.g. in the Jan Mayen region, increases in thickness and extent during the winter until far into the summer, and it is only in summer that it really melts. If it were the warmth from the underlying water that melted it the under side of the ice would, of course, melt both in summer and in winter, for if it were not the heat of the rays of the sun in summer that melted the ice and warmed the water, the latter would be warm enough to melt the ice in winter as well as in summer.

The fact is that the ice drifts with the water of the Polar Current and the temperature of the upper layers of the latter is near the freezing point of ice down to a depth of 80-100 meters, and it is therefore impossible for any appreciable warmth to be transmitted to the ice from below, except very occasionally, on the outside borders of the drift ice, where the latter is borne across warmer layers of water.

On the whole, both in the Polar Sea and in more southern latitudes off the east coast of Greenland, the

melting of ice in summer is due almost exclusively to the heat that comes direct from the sun, partly upon the surface of the ice and partly upon the surface of the water in channels between the ice floes, so that the uppermost layers of water are warmed and act upon the ice. This becomes strikingly apparent from the deep indentations which are formed in the ice exactly at the water line. On the other hand, the ice does not as a rule melt appreciably on the under side, indeed, as mentioned above, it may even increase in the course of the first part of the summer.



Pool of fresh water on a floe.

The circumstance that the upper layers of water can be heated by the rays of the sun in summer, down to depths greater than the thickness of the ice, so that warmed water comes under the thinner ice floes causes the latter also to some extent to be melted from below. As we have seen, this may likewise happen when the ice is driven out by the wind into the waters of the Atlantic.

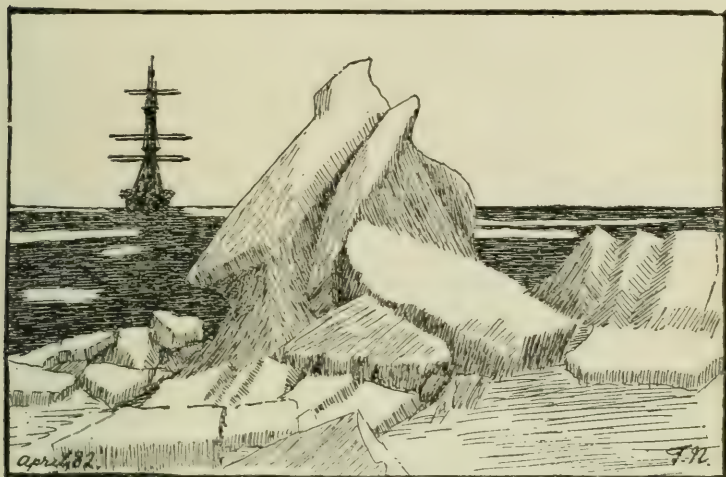
When the snow melts on the surface of the ice and also when the upper layers of ice melt, there are formed on the floes large pools of almost fresh water, and from these sealers and whalers obtain their supplies of water both for cooking and drinking and also for their engines if they do not use sea water in them.

In the manner described above, by freezing on the under side, mostly in winter and spring, and melting on the upper surface every summer, the ice lives on year after year. In these immense fields of drifting ice we therefore find ice-floes of all ages, from the newly frozen ice on the open channels, which is perhaps only an inch thick and will scarcely bear the weight of a man, to the huge floes several years old, and the enormous hummocks that may rise fifteen or twenty, sometimes, perhaps, even twenty-five or thirty feet above the water, and which go down one hundred and fifty or two hundred and at times two hundred and thirty, or perhaps two hundred and sixty feet below the surface of the water.

The older the ice becomes in those northern Polar seas, the thicker it grows, and by direct freezing, without the floes being jammed together or piled up on one another, they may after three or four years become ten feet thick, or possibly even more. But not all the floes or ordinary Polar ice are so thick, since the majority are of more recent formation. On the other hand, many floes consist of piled up ice, and may then be much thicker.

As by degrees the ice reaches the gap between Spitzbergen and Greenland and farther south, it is driven

towards the west along the coast of Greenland. This is due to the rotation of the earth, which causes all currents in the northern hemisphere to be deflected towards the right, the more markedly so the farther northward we proceed. In the course of its drift



Ice packed together into a hummock.

southward, therefore, a broad belt of Polar ice follows the banks of the coast of Greenland.

But besides this ice which comes from the north, large masses of ice are formed in these regions between Spitzbergen, Iceland and Greenland, and these may cover the sea to a wide extent east of the edge of the true Polar ice.

The sea there is easily frozen over because in the autumn it is usually covered with a light surface layer of water with a low salinity, which to a large extent is formed by the melting of the ice in summer.

As it is so light that even at freezing point it floats above the heavier and salter water underneath, this surface layer, which is often thin, is quickly cooled if the weather is calm, and then no great degree of cold is necessary for it to become covered with ice. If in addition there is a snowfall the process is greatly facilitated.

This ice usually increases rapidly, is broken up into large and small floes, is jammed together into small piles and hummocks, opens again, freezes and so on, in a manner similar to that of the Polar ice farther north; but it is thinner and the piles of ice are smaller, and as the floes are so young they have not been broken up and jammed together so many times. They are therefore flatter than the real Polar floes which are usually more or less humped, with greater or lesser irregularities that are rounded off by the heat of the sun in summer.

It is on this new winter ice that the Greenland seal seeks its breeding places in spring in the Jan Mayen Sea. It is therefore to this ice that the sealer proceeds in March and April, and it was there that we endeavored to plough our way forward on the "Viking" in order to discover these breeding grounds.

Of course there may also be found scattered amongst this ice older floes and hummocks which have come from farther north, but the real Polar ice, the élite of the Polar Current, is not encountered in great masses until we come farther in towards the east coast of Greenland.

It is this massive ice that we shall meet later on in

Denmark Strait when hunting the bladdernose, and there, so far to the south, the young, lighter forces, the first year recruits, have little by little succumbed in the struggle against the warmth of the south, whilst the "picked forces," the huge floes and hummocks, still continue to make a stand.

In the formation of the younger ice on the outskirts of the Polar Current in the sea between Spitzbergen and Jan Mayen and Iceland, there enters a new factor that does not play any part farther north in the



The result of the action of the warm sea on an ice hummock.

Polar Sea. This is the swell which comes rolling up from the open sea in through the ice, and which little by little is subdued by the floes, so that it is no longer noticeable at some distance in from the edge of the ice. This movement breaks up the ice into floes.

If we go far in, where the movement of the sea does not reach, the floes may be of huge dimensions, perhaps half a mile or more in length, and this is what sealers call "unbroken ice."

But the farther we proceed towards the outer edge, the smaller the floes become, and out there when the sea is in movement they are broken up and smashed against each other into a brash of ice that may cover the sea for a great distance outwards. This brash breaks the movement of the sea, and as by degrees the belt becomes broader, it protects the ice within against attack. In winter or spring, when it is cold, this brash again freezes into a firm covering, as soon as the sea becomes quiet.

We must not think of the edge of the drifting masses of ice as a straight line. It may of course be so to a certain extent, when wind and sea pack the ice tightly together, and it may then be difficult for vessels to penetrate into the ice. But if it is calm or the wind comes from the ice, the latter slowly moves outward. Promontories of floes creep out to sea, and deep bays are formed. Long open lanes and channels may appear in the ice, and "streams" may be torn quite loose and driven out to sea as separate fields of ice in strips that usually consist of small, comparatively thin floes that little by little are broken up by the waves into brash. But into all these bays and open lanes, and through these promontories, the sealer forces his way in order to find seals.

The water in these bays and open spaces is usually cold—near the freezing point—and when the temperature of the air is below the latter, and the weather is comparatively calm, new ice is usually formed and increases in thickness, especially if there is a fall of snow into the water. The reason why this new ice forms so

quickly may also be that the sea is there covered by a thin layer of relatively fresh water, which floats upon the heavier layer of cold sea water, the temperature of which is usually about 29.3° , and being cooled by this underlying water, the surface water, which has a higher freezing point, freezes as soon as it comes to rest and is not broken up by the waves. The ice is usually called by sealers "bay-ice."

As the surface of the water is practically never entirely at rest near the edge of the ice, but there is always a slight motion of waves, the newly formed crust of ice never has time to become continuous but is broken up into small, thin flakes, which by friction against one another are rounded off into small disks, and around their edges they have white, raised ridges of finely crushed ice formed by this friction.

As by degrees these disks become thicker and stronger they can bear more movement without being broken, and they are frozen together into larger disks which are encircled by white, raised edges in the same manner as the smaller disks so that they resemble large plates, with a pattern of small, white rings from the original plates.

The sealers have named this "pancake ice," the round disks or "plates" bearing a certain resemblance to pancakes.*

Finally the disks become so thick that they freeze

*The view has been put forward that these small disks of ice are due to the formation of the ice at a certain depth in the sea from whence they suddenly rise to the surface (the so-called ground ice cf. Prof. Edlund and Aug. Quennerstedt). The impossibility of this theory will be discussed later on in the present work.

into a firm covering that can no longer be broken by the slight movement of the waves and we then see a remarkable surface, greenish or blueish-gray like all newly formed marine ice, but with a pattern of round, white rings along the edges of all the original small and large "plates," so that the whole has the appearance of a floor made of round tiles.

The newly formed greeny-blue or gray-blue bay-ice is soon covered after the first snowfall like the other ice. If there is time for it to grow thicker without being broken up and smashed by the swell, it becomes a part of the drifting masses of ice which the seal principally seeks for its breeding ground.

All the ice formed in this sea between Spitzbergen and Iceland in winter and spring is melted again in summer, in June, July, August and September, when a great deal of the true Polar ice that has come from the north also melts.

It is to a great extent the formation of these masses of new ice in winter and spring, and the melting of them in summer, that cause the great annual alterations in the extension of the ice in the sea between Spitzbergen and Jan Mayen, and also between that island and Iceland.

It has been assumed by prominent oceanographers that the melting of the great masses of ice in this sea has the effect of greatly cooling its layer of water and is of great significance to the dynamics of the sea throughout the world as the most important factor in producing the great ocean currents, e.g. the so-called Gulf Stream in the Norwegian Sea.

This is essentially a mistake. As these masses of ice freeze and melt in the same sea it is impossible for them as a total result to produce any cooling of its masses of water.

It goes without saying that when the ice melts in summer a great deal of heat is imprisoned, and the heating of the surface of the sea and of the air over the sea by the rays of the sun is thereby greatly delayed. But when the same ice freezes in winter and spring, the same quantity of heat is released and delays the cooling of the surface of the sea and of the air over it to the same degree.

North-east of Jan Mayen the drift ice often forms in spring a great promontory pointing eastward, and mainly consisting of younger ice from the winter or the same spring. This is obviously due to a branch of the Polar Current that there runs in an easterly direction.

The fact is that in the sea between Jan Mayen and Spitzbergen there is a great vortex movement, or perhaps in places two vortices. (See Map page 37.)

In the eastern part of this sea, west of Bear Island and Spitzbergen, this warm Atlantic current goes to the north and from thence masses of water bend westward, usually at about 74° and 75° N. and 77° and 78° N.

In the western part of this sea, along Greenland, the Polar Current goes towards the south, and between Jan Mayen and 73° N. Lat. a branch of it bends to the east and joins the great vortex. This branch of the current has naturally a tendency to carry the ice out

into a promontory, whilst farther north the warmer branch of the current that comes from the east has a tendency to form a bay.

This bay is called by sealers "The Great Bight" or also "Bay Ice Bight", because the ice met with there is only new ice, i.e. bay ice, and not older ice.

The form and extent of the "Promontory" and "Bight" may vary greatly from one year to another, mostly on account of alterations in the conditions of the wind.

In certain years, especially when there are great masses of ice stretching far to the east, the appearances of both the "Promontory" and "The Great Bight" are not very characteristic, mainly perhaps because the masses of ice may have been driven across the Bight as well.

It is in the heart of the great Ice Promontory that sealers believe the Greenland seal or saddleback prefers to go in order to lie up on the ice and give birth to and suckle its young ones in peace.

In the sea south-west of the Jan Mayen there are also probably great vortex movements and it is possible that there too branches of the Polar Current issue that can form promontories of ice towards the south-east, most probably near 69° N. Lat.

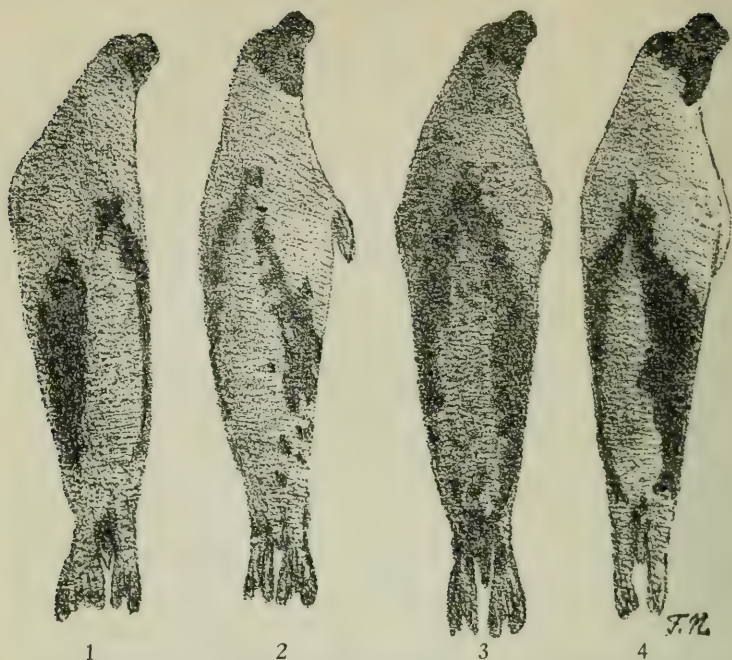
In certain years, when the boundary of the ice lies far to the west, the breeding grounds of the saddleback may be found in that region, south-west of Jan Mayen.

III

THE GREENLAND SEAL OR SADDLEBACK.

THE Saddleback or Greenland Seal is of medium size. The adult male is a good 5 to 6 ft. long, and is grayish white in color. The front part of the head is black and along both sides of the body there is an oval, black, saddle or harp-shaped patch, and sealers therefore call it the *saddleback*. Newfoundlanders call it the "harp seal." Danes in Greenland call it "svart-side" (i.e. "black side"). On the upper part of the tail there is also usually a little black patch. (See picture below).

The adult female is slightly smaller than the male. It also is of a whitish color and has dark patches like the latter. Previous writers have maintained that the female has no dark saddle marking on the sides and back and no dark head. This remarkable error appears to have become stereotyped in the literature. The saddle markings of the female may be just as black as those of the male, but they are often somewhat grayer, and are frequently less connected or are divided into smaller patches. The head of the adult female is darker than the body, but with the exception of certain black markings it is usually lighter



Saddlebacks. 1 and 2 females, 3 young male, perhaps four years old, 4 old male.

than the head of the male. In some females the entire front part of the head may be rather dark.

The dark or black areas, both on the sides and head, may vary a good deal in form, both in males and females.

The saddleback gives birth to one pup a year; twins are quite an exception if they ever occur at all. The Eskimo I met in Greenland did not appear to know of any instances. Once when we mentioned that women in Europe sometimes give birth to twins or even triplets, an Eskimo woman laughed mockingly and said, "Europeans are like dogs, human being (i.e. Eskimo) and seals have only *one* young one."

The newborn pup of the saddleback is 23 to 27 inches long, i.e. more than one-third the length of the mother. It is very fat, with a thick layer of blubber under the skin, and comes into the world on the drift ice with a beautiful white coat of long, soft wool. The length of the hair on its back and sides is about $1\frac{1}{4}$ to $1\frac{1}{2}$ in. The sealers call these newborn saddlebacks "white-coats."

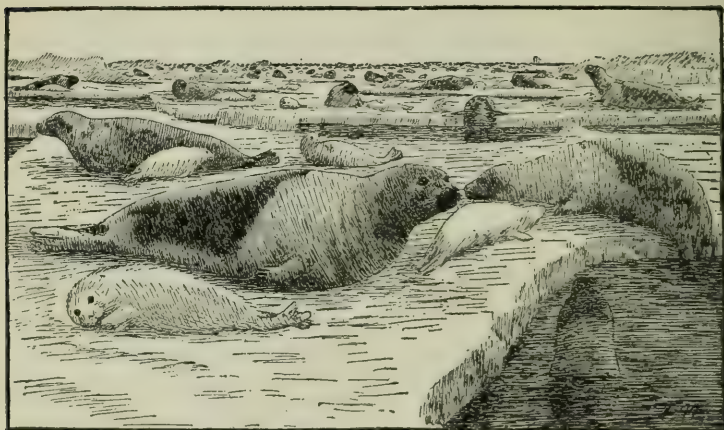
As long as they have this coat of wool they do not willingly enter the water, and fall an easy prey to the sealers, who go up to them on the ice and hit them on the head with their seal-clubs.

If by accident they fall into the water, e.g. when the ice breaks or the sea washes over the floe, the "white-coats" have difficulty in getting out by themselves, and may perish if their mothers do not help them up on the ice again. The mother "may then attempt to swim with the pup between her fore-flippers, or push and throw it forward by means of her snout."

Mr. Carroll, who has written about the sealing near Newfoundland, relates that when a storm reaches the drift ice and there is a heavy sea, thousands of young seals may be destroyed. He has often seen the mothers come up between the floes in a heavy sea, and drag their young ones from the ice into the water in order to take them out of danger. Norwegian sealers have also related similar incidents about the saddlebacks in the Jan Mayen sea.

The young one is suckled by its mother for about 3 weeks. According to the sealers, she is usually with it on the floe and gives it milk twice every 24 hours,

preferably in the morning and evening, whilst she remains in the water during the day, mostly no doubt in order to find food. The young one lies alone on the ice and often cries for its mother. The cries of thousands of young seals at the breeding grounds, many on each floe, can be heard at a distance of several miles, especially if you place one ear near the ice.



A herd of Saddleback Seals on the ice.

It sometimes happens that the mother seal endeavors to defend her young one against the sealers and is then easily killed with a seal-club.

While the pup is being suckled it grows rapidly in size and plumpness. It is usually estimated that the blubber of 7 to 10 "white-coats" will yield a barrel of oil.

When the young one is from 14 to 18 days old it begins to shed its woolly coat. The wool falls off in patches, first near the hind flippers and on the head, then on the belly and near the flanks and lastly on the

back. This process of moulting lasts from 8 to 10 days, and not later than 4 weeks after birth the entire coat of wool has disappeared and the young one has acquired its dappled young seal's coat of smooth shiny hair. The main color is a silvery gray and there are more or less dark spots all over the body, especially along the sides. (See picture in Ch. IX). The lightness of the main color and the size and number of the spots may vary in different young seals. The back is often somewhat darker and more uniform in color than the sides, and the under-side is lightest, being whitish, although there may be a few quite large, dark spots.

The young saddlebacks with this coat are usually called "blue-backs."

It is very important for the sealers to reach the breeding grounds before the "white-coats" have moulted their wool. The young ones are then easy to kill and usually lie close together on the ice. In addition the skins are somewhat more valuable before the hair has begun to fall out at the beginning of the moult. As much as 2 shillings extra may then be offered for each skin, the usual price being, in the eighties, about six to seven shillings per skin. While the change of coat is proceeding the young ones are deserted by their mother, and remain for some days without food as they cannot yet enter the water; they therefore diminish in bulk. But when the moult is completed they are ready to seek food for themselves in the sea. They are then about 3 ft. in length.

During the first days the young saddleback swims

and dives with difficulty, and soon returns to the ice. But after a short time it feels at home in the water. Even now the young ones may be so tame that they can be killed on the ice with a seal-club, especially on a calm, sunny day. But as a rule they have become so timid that it is necessary to shoot them with a rifle.

In the beginning they mostly live on small crustaceans (to some extent *Schizopodes*), of which there are great quantities in the upper layers of the sea. I have found the stomachs of "bluebacks" crammed with them. Later on in the summer they also catch fish, especially the polar cod (*Gaidus saida*) and the capelan (*Mallotus vilosus*), and any other fish they can secure, just as the adult seals do.

The saddleback retains its spotted youthful dress for two or three years. During that time the spots decrease in number at every annual moult, until the males and females, probably after the age of three, begin to acquire their more uniform grayish-white coat, and the dark markings on the sides and head begin to develop, earliest perhaps in the male.

It has been contended that the young seals begin to breed as early as a year after their birth. This appears to me to be doubtful. On the other hand I consider it possible that they are sexually developed at the age of two years.

The saddleback is one of the most skillful swimmers amongst seals, and makes longer migrations than any of the others.

It lives out on the drift-ice without being limited to any coast or country, and is distributed over the entire

Polar Sea north of the Atlantic Ocean, from St. Lawrence Bay, Newfoundland, Hudson Bay and the western part of the Canadian Arctic islands (from about 95° W. Long.) to the west, over Davis' Straits, the northern Norwegian Sea, and Barents Sea to Kara Sea in the east. It is doubtful whether as a rule it penetrates farther east than Cape Chelyuskin in the sea north of Siberia. Nor is it usually found in the sea north of Canada, west of 95° W., nor in Bering Sea.

It usually keeps to the drift-ice near the edge of the pack, where there is sufficient open water between the floes, and disappears from the ice as soon as it closes up. It is therefore not met with in the closely packed drift-ice far from the open sea.

It does not make breathing holes in the ice like those of several other kinds of seals (especially the floe-rat and bearded seal), but as a rule it lies near the edge of the ice floes in order to be able to dive into the water the moment danger threatens.

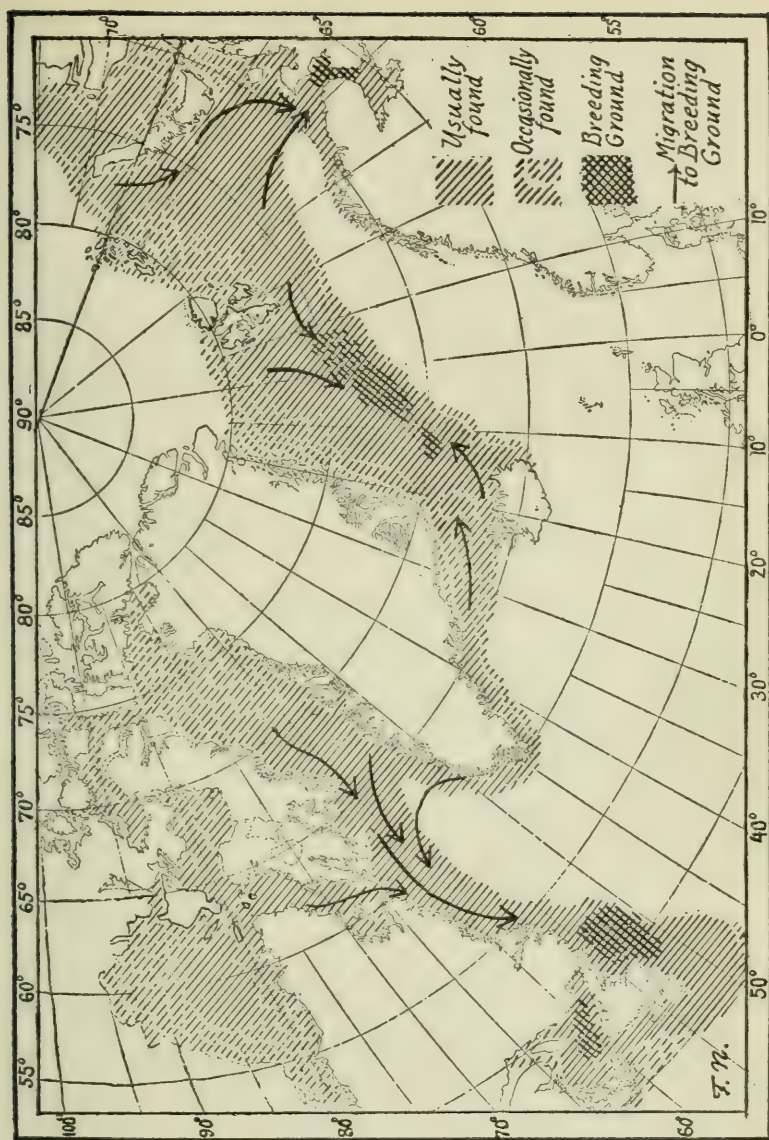
According to Russian sources, however, these seals and their young ones may lie during the breeding season in the centre of the large floes, and have a hole in the ice through which they can go up and down. According to Mr. Carroll, the seals on the breeding grounds, i.e. near Newfoundland, are said to keep holes open in the ice so that they can ascend and descend through them. This, however, can only be true to a certain extent, for we know that on the breeding grounds in the Jan Mayen sea it has happened, as in 1882, that the seals have "frozen up," so that they

cannot enter the water, and the old females can then be killed on the ice with seal-clubs just like the young ones. Carroll also mentions that the seals at Newfoundland can be "embayed" so that they cannot enter the water. This happens, he says, because the ice is jammed, but it seems probable that it also freezes into a solid mass, and it may then happen that the seals set off on a long journey across the ice in order to reach open water.¹

As the saddleback shuns the compact ice it does not reach as far north into the Polar sea as the floe-rat (*Phoca hispida*) and the bearded seal or ground seal (*Erignathus barbatus*). As far as I am aware the most northerly point where the saddleback has been seen is in Smith Sound and Kennedy Channel, where Bessels saw it in 1871-72, and where Greely saw it on August 10th, 1881, in $81^{\circ} 30' N.$, and off the north-west coast of Franz Josef's Land, in about $81^{\circ} 20' N.$, where I saw it in 1895.

At certain times of the year it may also be met with far beyond the region of the drift-ice, and e.g. it visits the north coast of Norway every spring, where it is called the Russian seal, and in certain years, e.g. 1902 and 1903, there has been a large number of them. Considerable numbers go regularly every year to the southwest coast of Greenland, far outside the true region of the drift-ice.

¹William S. Bruce (Proceeding of the Royal Physical Society of Edinburgh, Vol. XIV, p. 82, 1899) says that Dr. Koettlitz during a sledge journey along the coast of Franz Josef's land shot a saddleback that was lying near its "winter hole" on the ice. I am inclined to believe that there must be some misunderstanding here. As far as I am aware, it has nowhere been observed that this species of seal maintains winter holes, or in general keeps to firm or solid ice where such holes would be necessary.



The distribution of the Saddlebacks, and their migrations to the breeding grounds.

A few saddlebacks have even gone as far south as the North Sea or have even reached the coasts of the British Isles and the English Channel. It has been found along the east coast of America as far south as New Jersey.

The lengthy migrations undertaken every year by the saddlebacks are truly remarkable. Their wide range seems to be connected, to some extent, with the ice conditions. When, for instance, large numbers of these seals suddenly appeared off the north of Norway in 1902 and 1903 this very unusual occurrence was obviously due to the exceptional ice conditions in Barents Sea.

The main objects of their annual migrations appear to be four in number:

1. To find breeding grounds on the ice where their young ones can be born in spring.
2. For the purpose of mating.
3. For moulting, and
4. To search for favorable places in the sea where food can be found.

The first three—breeding grounds, mating and moulting—follow each other in immediate succession and therefore take place during the same great migration in spring.

In February or March—the time varies in different districts—the saddlebacks gather together in large numbers, hundreds of thousands or more, at certain large breeding grounds on the ice.

The females go there in order to give birth to their young ones. The males go there for the purpose of

mating, and strangely enough there are also a large number of young seals who cannot yet have reached sexual maturity. They may probably have followed the general crowd, for seals are remarkably sociable creatures.

The young ones are born on snow-clad ice floes of medium thickness, and are fed in the manner already described.

According to statements made by sealers, mating takes place on the ice immediately after the females have left their young ones, or about three or four weeks after the birth of the latter. I cannot make any pronouncement regarding this from my own observation. It has been asserted that the female may mate even before she has left her young ones. As a rule the male appears to keep to one female.

The female should consequently be pregnant for about eleven months. Three embryos found in saddlebacks at Sukkertoppen (on the west coast of Greenland), August 20th, 1898, were $2\frac{1}{2}$ to $2\frac{3}{4}$ inches in length. One embryo found at the same place on August 30th was about $3\frac{1}{8}$ inches, and another taken on September 4th of the same year was $4\frac{1}{4}$ inches.

In October, 1888, I saw many adult saddlebacks caught with nets at Godthaab on the west coast of Greenland. The majority of the females were pregnant and the embryos were somewhat larger than those mentioned above, but varied a little in size. Unfortunately the embryos of which I took charge have since been lost and I have no notes regarding their length.

It seems remarkable that the embryos are not larger

so late in the year. If the mating took place in April the embryos which were not more than $2\frac{1}{2}$ to $2\frac{3}{4}$ inches long on August 20th, should be about four months old, and during the remaining seven months of pregnancy they thus grow to a length of 23 or 27 inches. It appears probable that there must be a kind of pause in the development of the embryo during the first period.

When mating is over the crowds of seals disperse from the breeding grounds. The males and females usually separate and for the most part keep in different herds the remainder of the year and meet again at the breeding grounds the following year. The young seals, too, usually go off in separate herds.

When the seals leave the breeding grounds and proceed to the edge of the drift-ice they soon gather together into herds. The young ones keep by themselves from the first, usually near the extreme margin of the ice, and on the strips ("streams") of ice outside, where they find sufficient small crustaceans in the water.

The adult males ("he-seals" as the sealers call them) form huge herds numbering thousands, but these may also include some females and young ones.

They swim through the water at great speed and close together. When they rise to the surface all together they dash along. They gambol, turn over and swim on their backs. Some jump clean out of the water. Then the whole herd dive under at the same time. They always travel at full speed, and unlike other kinds of seal they rarely remain quiet in one

place, and when they are travelling it is difficult to get within rifle-range even in the water.

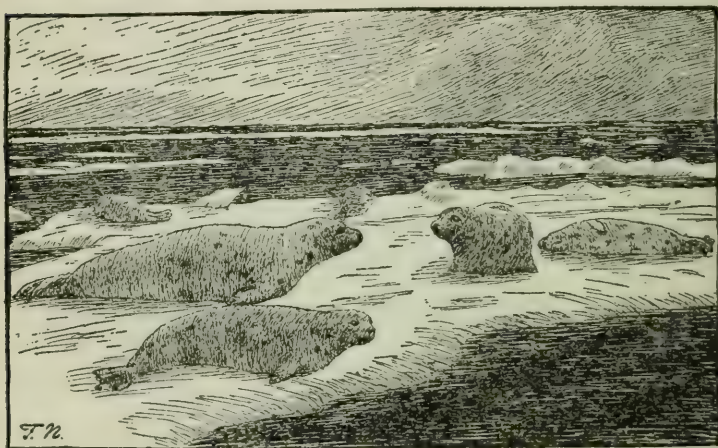
Icelanders believe that the herds of this seal which they call "hav-sæl" (sea-seal) or "vade-sæl" usually swim in a triangular formation, headed by an old seal, the "Seal king," whose movements are closely followed by the others.

Then comes the moulting time of the adult seals, which lasts about one month, usually towards the end of May. The seals then lie on the ice, and are less willing than usual to enter the water, especially when they have been dried by the sun, and they usually lie on the floes scratching and sunning themselves.

The herds of male seals may then extend for many miles, and the seals lie so close together on the floes that it may be scarcely possible to see the ice between them. At a distance the whole herd looks like a continuous stretch of dark land rising up in the surrounding ice.

At that time it is easier to get within range of them than at others; but even then these seals are wary and shy. At short intervals they lift their heads and look around, and the hunter must row or creep carefully towards them and seek cover behind the ridges of ice. They are not so much frightened by the sound of a shot as they are if a seal is wounded by a bullet in its body and gallops about on the floe and dives into the water. Then all the nearest seals usually plunge in too. It is therefore important to hit the head accurately so that the animal drops dead at once; this is especially true of the first shots, and one must rather miss than wound

the animal by a bullet in its body. If the herd has been hunted several times it is almost impossible to get within range. But if the hunter can "shoot his way into" the herd with dead seals around him, it becomes usually an easier matter, for the other seals lie quieter when they see that the dead ones nearest to the threatening danger do not move.



Young Saddlebacks, one month old, and one year old.

During the moult and also in the breeding season the adult seals take little food and therefore become very thin.

In March and the beginning of April a saddleback shot in the throat whilst in the water, so that the wind-pipe gets stopped by blood, will usually float, at least for a few minutes, and one can "hook" it, whereas in May and June it usually sinks at once.

The seal's blubber forms a thick continuous layer under the skin over the whole body and it comes away

with the former when the seal is skinned. If the adult seal is fat the layer of blubber may be 2 to $2\frac{1}{2}$ inches thick, but in a thin seal it is barely $\frac{3}{4}$ inch.

When the saddleback reaches the breeding grounds in March it is in good condition. The adult male then yields from 100 to 180 pounds of blubber, whilst the females yield less, 100 to 130 pounds. After April there is scarcely more than 70 to 90 pounds of blubber on an adult seal.

It is estimated that on an average two or three adult seals (at the beginning of April) yield one barrel of oil, whilst at the end of May or in June, after the old ones have moulted, from seven to eight adult seals on an average are required to yield that amount.

After the moult is completed, the great herds of seals are scattered into smaller herds over the entire Arctic Sea in order to find the best places for food. The herds mostly live scattered about on the drift-ice, and to a great extent live on the small crustaceans of various kinds which occur in large quantities. They also eat pteropods (*Clione borealis*) and other small creatures that swim in the sea, and at places where these are found in large numbers the seal may be crammed full of them.

Otherwise the saddleback prefers fish, which it catches in mid-ocean or follows to the coast, and for that reason returns year by year to several of the coasts of the northern seas. It is fond of capelan and herring and cod-fish of various kinds, e.g. polar cod (*Gadus saida*), and rose-fish and other fish such as halibut and

the like, when it can get them. It also often eats cuttlefish.

As mentioned before, this seal is an unusually powerful swimmer and I have been told by Eskimo that on the rare occasions when a wounded seal shows fight, the adult male saddleback is regarded as one of the most dangerous on account of its speed and agility.

It is said to be able to dive down to incredible depths. Thus off Rödöy in Helgeland several seals were captured in nets at a depth of 100 fathoms, and according to Robert Collett a saddleback was actually caught on a hook of a set-line 150 fathoms beneath the surface of the sea near Vardö. It is difficult to conceive how a lung-breathing mammal could sustain the pressure at such a depth, e.g. in this case about 28 atmospheres. Amongst other things, a powerful muscular system is needed in order to close the nose and mouth so firmly that the water cannot penetrate into the lungs at such a depth.

When in the water the seal propels itself by means of a powerful lateral motion of the hinder part of the body, while the hind flippers which are spread out vertically, thus forming an excellent "propelling" apparatus. The fore flippers are not used for propulsion but in order to maintain balance and to steer. It can attain a most incredible speed in the water. When it darts past underneath one it almost looks like a shadow or a streak.

On the other hand, the saddleback moves about on the ice with difficulty. Its hind limbs, the hind flippers, cannot be directed forward, and it usually advances by

hunching up its back so that the hinder part of its body is drawn forward. It then stretches itself out again so that the fore part of its body is pushed forward while the hinder part with the hind flippers keep a hold on the ice.

By repeating these movements rapidly it progresses remarkably fast with an undulating motion—a kind of undulatory gallop, although not faster than a man can run.

Doubt has been expressed as to whether it uses its fore flippers in this movement or whether they are held backwards close to its body. I have often seen it take hold of the ice with its fore flippers in order to push itself forward, and in the tracks of a seal that has gone over ice floes one may usually see the small marks made by its use of the fore flippers. When it lies on the edge of a floe and gets ready to dive into the water we often see it advance its front flippers in order to get a purchase on the ice.

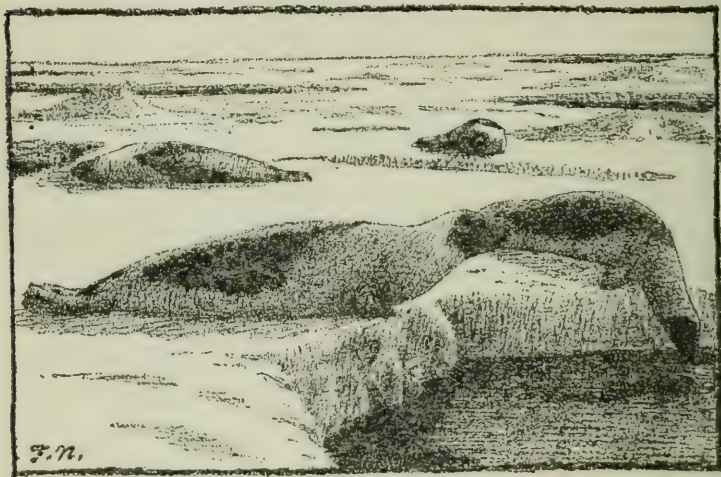
When it clambers on to the ice from the water it often helps itself up by placing its fore flippers on the edge of the ice.

Carroll relates that when the seals off Newfoundland are “embayed” and cannot enter the water owing to the ice being jammed, they then set off across the ice in a direct line for the water, which he considers that they can scent even at a distance of fifty miles. He says that they can be seen stretching out their necks and sniffing the air. I have my doubts about this, and am more inclined to believe that the dark sky above

open water would be just as good a guide to them, and such a water-sky can be seen at a great distance.

He shot some of these wandering seals, "with the hair and skin worn off the fore flippers and bleeding."

I have not heard of such long wanderings over the ice in the Jan Mayen sea. They certainly do not take place while the mothers are suckling their young ones,



Saddlebacks on the ice.

which they will not leave during that period. It is also extremely seldom that the ice remains compact and unbroken for a sufficiently long time to render such wanderings necessary in those seas.

The saddleback sleeps on the ice, and its sleep is remarkable. At intervals of a few minutes it opens its eyes, lifts its head, looks around, and then takes another forty winks. It is possible that this takes place quite automatically and unconsciously, but if any danger is discerned the animal is at once wide awake.

If there are many seals in company, as is usually the case, the watch appears to be specially undertaken by certain seals, and it is asserted that these are often females.

The seals certainly sleep in the water also, but during the time when they are thin this must be difficult, since they have to work continually in order not to sink.

The saddleback can lie on the ice for long stretches at a time, especially when moulting, and it appears to have an incredible capacity for idling for days at a time.

It is extremely remarkable that even if the seals, both of this and other kinds, have lain on the ice for a long time and approximately on the same spot, no depression in the ice is melted under them. They are warm-blooded animals with about the same blood temperature as we human beings. I took the temperature of a bladdernose and found it to be between 98.2° and 99.3° . If an ordinary land animal were to lie on the ice for so long, a deep "nest" would be melted under it.

It is evident that the thick layer of blubber under the skin acts as an insulator, and prevents the loss of heat that would result from such melting of snow and ice. Externally the skin has thus a temperature approaching that of their surroundings.

These seals are far more lively and frisky in the water than on the ice, and in the former they often gambol and play. They stand upright with half of their bodies out of the water, just as when we "tread water." Sometimes they jump clean out of the water, dive down throwing their hind flippers high in the air

at each dive, turn over on their backs, then on their bellies again, and in general appear to be thoroughly enjoying themselves.

Man is beyond all comparison the worst enemy of the saddleback. By reckless slaughter, especially on the breeding grounds, there have for years been destroyed at least one million seals per annum, so that their numbers have greatly decreased, and the proceeds of seal-hunting have by degrees greatly diminished, both off Newfoundland and in the Jan Mayen sea, though not so quickly as might have been expected. It is possible that the number of saddlebacks in the seas between Iceland, Greenland and Spitsbergen may have increased somewhat in recent years, as not quite so many have been captured on the breeding grounds since the beginning of the present century.

Next to man the most dangerous enemies of this seal are the polar bear and the grampus or killer whale (*Orca gladiator*). The polar bear stalks these seals on the ice, usually while they are asleep, and mostly chooses the young ones. It cannot manage to capture them in the water except by jumping upon them from the ice.

But in the water the grampus is the more dangerous, and even such a splendid swimmer as this seal is no match for it. The seals are therefore mortally afraid of this whale and if it is in the neighborhood the seals at once go up on to the ice and do not enter the water again as long as it is near.

Carroll relates that he has been on floes when seals have rushed on to the ice pursued by "sword-fish" (i.e.

grampus) and sharks (he probably means Greenland sharks) and he was obliged to shoot at these brutes to keep them off. Seals will seek protection between a man's legs. They may even hurl themselves into boats in order to save themselves. Poor creatures! Of course they do not know that man is even worse than the grampuses and sharks.

He also relates that when the seals are floating about on single "pans," he has seen "sword-fish" (grampus) and sharks taking them. The "sword-fish" will get on one side of the "pan" and press it down to such an angle that the seals slip off into the water among them and are torn to pieces.

I have heard that while seals were lying on the edge of floes it has happened that a grampus has tried to sweep them off the ice by a blow with its tail. Indeed, according to the Eskimo, one or several grampuses will run their heads against the floes from underneath in order to break it or upset it so that the seal may fall into the water.

That the saddleback is also sought after by the Greenland shark (*Somniosus microcephalus*) is shown, inter alia, by the circumstance that seals, especially young ones, are found in its stomach.

It is incomprehensible to me how these sluggish, sleepy fishes can manage to get hold of a living seal, and I am inclined to believe that this can only take place whilst the seal lies sleeping in the water, or when, by some accident or other, it swims right into the jaws of these ugly monsters. The sharks mentioned by Carroll, and which go on to the floes to attack seals,

are also presumably Greenland sharks, but it is difficult for me to understand how such a thing can take place. At any rate I have never seen anything like it. On the other hand the sealers have seen Greenland sharks stretch up to the edge of the ice where the carcasses of skinned seals were lying.

Besides the blubber, the skin of the saddleback is valuable; generally it is tanned and used as leather. It is highly prized by the Eskimo because it is tougher and more watertight than the skin of the bladdernose or the floe-rat. It is therefore mostly used for covering their Kayaks and for watertight sea clothes.

It appears that a distinction may be made between three divisions or "tribes" of Greenland Seals. A western tribe in Davis' Strait southward to Newfoundland and St. Lawrence Bay, and northward to Baffin's Bay; a middle tribe in the sea between Spitsbergen, Greenland, Iceland, and Jan Mayen; and an eastern tribe in Barents Sea, White Sea and Kara Sea.

Each of these tribes has its own breeding grounds on the ice to which the seals resort every year in order to give birth to their young ones. It is difficult to say how sharply the line of demarcation is drawn between these tribes, and to what extent seals from one district resort to another. But on the whole these tribes appear to be fairly well separated. This is indicated, *inter alia*, by the circumstance that their breeding seasons are not simultaneous.

THE WESTERN TRIBE.

The western tribe, which to a great extent lives in

Davis' Strait and on the drift-ice along the coasts of Labrador and Baffin's Land, and also to some extent in Hudson Bay and Baffin's Bay as far north as Smith Sound, visits the drift-ice north-east of Newfoundland early in spring in order to give birth to their young, in March.

As early as the autumn the hosts of seals begin to migrate southwards along the west side of Davis' Strait.

They pass along the coast of Labrador at the beginning of winter, before the ice is formed, and usually hug the shore. "They appear first in small detachments of half a dozen to a score or more of individuals; these are soon followed by larger companies, which increase in frequency and numbers; in a few days they form one continuous procession, filling the sea as far as the eye can reach. Floating with the Arctic current, their progress is extremely rapid, and in one short week the whole multitude has passed." It is said that during this migration the seals often follow the shoals of "white-fish" right into the bays.

In November the herds of seals reach Belle Isle Strait, and many of them proceed through the latter into St. Lawrence Bay, whilst the main stream continues towards the south-east along the east coast of Newfoundland, about as far as the mouth of Trinity Bay, where they leave the coast and go out to the Grand Bank, which they reach at the end of December.

They stay there for at least one month, and are joined by some of the seals that went into Belle Isle

Strait and afterwards proceeded along the west coast of Newfoundland.

In the first half of February the adult seals set off again northward from the Grand Bank to the drift-ice north-east of Newfoundland, upon which they go at the end of February in order to give birth to their young ones. Some of the young seals remain behind on the bank for a time.

A portion of the herds of seals that enters St. Lawrence Bay spreads, and may proceed right up to the mouth of the River St. Lawrence; during their passage along the coast the seals are caught in nets from November to the end of December. When breeding time approaches the herds assemble on the drift-ice in the bay east of Anticosti, between the Magdalena Islands and Belle Isle Strait, and the young ones are born there in March. The seals are hunted during this time.

At the end of April and in May the seals reappear near the coasts, after which they make their way farther northward through the strait.

The number of seals that remain in St. Lawrence Bay during the winter and breed on the ice there must be considerable. According to official Canadian statistics there were caught in that bay, e.g. between 1874 and 1883, an average per annum of 23,630 seals, and the majority of these were evidently saddlebacks.

But the greatest and most important breeding grounds of this seal are on the drift-ice to the north-east of Newfoundland.

The quantity and extent of this ice, which flows

southward with the Labrador current, may vary greatly from year to year, being highly dependent upon the state of the wind. The great breeding grounds may therefore vary a good deal in situation. In some years, when the ice extends far out, they must be sought at a considerable distance out at sea, while in other years they may be nearer to the coast. But I am inclined to believe that they almost always lie within the edge of the broad coastal bank which stretches north-east from Newfoundland, with depths extending down to 150 and 200 fathoms, for the drift of the ice is much slower over the bank than outside the edge where the current is swift.

The seals usually resort to the somewhat larger floes in the drift-ice, and sealers may have difficult work in finding their prey and forcing their way in. The men often have to walk long distances over the ice to reach the young seals.

In each year there are usually a number of ships that do not find the seals, or at any rate secure very few of them. In exceptional years the ice is so firmly frozen up that no ship can force its way into the breeding grounds.

The number of seals that congregate on the ice is enormous. They amount to many hundreds of thousands, and even to millions. In many years during the last century over 500,000 seals were caught, and a single ship might secure from 24,000 to 26,000 seals on one trip. Indeed, according to statistics, one ship (the "Neptune") secured 42,000 seals on one trip (1884). But these vessels had especially large crews.

Thus the "Neptune," 465 tons (nett?) had 299 men, whilst some of the other ships had over 300.

These ships often make two trips. On the first they obtain a cargo of young seals, and then go to land and discharge. This done, they set out again and may secure as many as 1500 to 2000 adult seals, or more.

A law provides that sailing ships must not go out sealing before March 1st, and steamers not before March 10th.

The seal usually gives birth to its young in the early part of March, usually between March 5th and 10th. The young ones remain lying on the ice until some time in April, when they enter the water and are able to find their own food. It is important, therefore, to reach the breeding grounds early enough to catch the young ones while they are still on the ice and can most easily be killed.

After mating has taken place, the seals begin to disperse at the beginning of April.

It is said that the adult seals usually stay on this ice while moulting; then in May they set off northward in enormous swarms, and they keep far out at sea in order to avoid the strong Labrador current nearer the coast.

They then spread out in large and small herds on the drift-ice in Davis' Strait and to the north of this. Some of them evidently resort to Hudson Strait and Hudson Bay, and another portion proceeds towards the west coast of Greenland.

They usually arrive off the southern part of the west coast of Greenland in the middle or at the end of May,

and the adult seals are then greatly emaciated, because during the periods of breeding, mating, and moulting they eat but little. Their arrival off the west coast of Greenland coincides with the yearly arrival of great shoals of capelan, upon which they live.

The seals first arrive off the southern part of the west coast in the Julianehaab district, and some days later they appear farther to the north. Apparently they come from the sea, from Davis' Strait, and proceed northward along the coast.

There they remain until some time in July, when they disappear again. The Eskimo say that they migrate to the west. The arrival and departure of the seals and of the capelan coincide. The seals often seem to disappear from the southern west coast some days before leaving that farther to the north. Thus they are said to leave Bisco Bay after the middle of July or at the beginning of August. The capelan is usually found there in large numbers in the middle of July, and with it large herds of saddlebacks.

In the latter part of September large numbers of these seals again arrive off the west coast of Greenland, and they are then very fat. They are most numerous in October and November, when the Eskimo catch a great many of them, both with nets and with harpoons. It is asserted that during this migration too, the seals first arrive at the coast in the south and then proceed northwards along it.

During the winter, from November onward, they as a rule become gradually scarcer, though they keep more or less near to the coast until February, or close upon

March when, according to the Eskimo, they set off westward, evidently in order to proceed to their breeding grounds in the south. Presumably they follow the edge of the drift-ice along the west side of Davis' Strait. It is said that the females are the first to disappear. At the end of May comes the great return migration. Some of the seals are said to leave the coast of Greenland as late as the beginning of March, and as some females have been found a few days later near the Greenland coast with milk in their udders, it is considered (cy. Tabricius) that their breeding grounds cannot be so very far distant. No doubt the most probable explanation is that these females have accidentally lost their young ones.

We have seen that a number of saddlebacks breed on the ice in St. Lawrence Bay. It is conceivable that there are also small breeding grounds in the drift-ice farther north, in addition to the great breeding grounds north-east of Newfoundland.

In Greenland the saddlebacks mostly keep to the southern part of the west coast. Of all the animals hunted by the Eskimo these are the most important. In addition to blubber and meat they provide him, as mentioned before, with skins for covering his Kayak and for making clothes to wear at sea.

According to Dr. Rink's report (in 1857) the annual catch by the Eskimo along the west coast of Greenland amounted to between thirty and thirty-six thousands of these seals, of which only three thousand were caught off the north-west coast.

But these quantities are small as compared with

those caught by Europeans and Americans on the great breeding grounds, where the extensive slaughter has appreciably reduced the number of seals. As we have seen, the catch of a single ship in a few weeks off Newfoundland may exceed that of all the Greenland Eskimo in a whole year. To the Eskimo in Greenland the seal is almost a vital necessity, while its capture is of comparatively little importance to the European and American communities.

The saddlebacks are also found along the southern east coast of Greenland, although the numbers do not appear to be great. They are reported to have been seen there both in spring (April) and in summer (July). It is possible that these seals also belong to the western tribe that visits the breeding grounds off Newfoundland.

At Angmagsalik, about $65^{\circ} 40'$ N., they commonly arrive in large numbers from the north in June and July, remaining there until late in the autumn. According to other reports these seals go there twice a year, in July and September. In the former month both old and young seals come in to the coast. In September they appear in herds, and according to the Eskimo, they migrate southward. Most probably these seals belong to the middle tribe that resorts to the breeding place in the Jan Mayen sea.

THE EASTERN TRIBE

The eastern tribe of saddlebacks that live in Barents Sea, and also to some extent in Kara Sea, has its breeding grounds in the outer part of the White

Sea near Mezen Bay, and south-westward at the entrance to the White Sea itself. Here again, therefore, the breeding grounds are in the most southerly part of the great area where this tribe lives.

In the late autumn there is a great migration of seals to the south, and according to certain Russian sources it begins to appear in the White Sea as early as the beginning of November, whilst according to other reports it does not arrive until the beginning and middle of December. The herds come both from the east, along the coast from Nova Zembla, and also from the north across the Barents Sea. They include both adult and young seals.

It appears that the saddlebacks assemble in the White Sea not only to breed and moult, but also to feed on the great multitudes of Polar cod that enter that sea in late autumn and winter. This would seem to be the explanation of why these seals arrive so long before the young ones are born. When large numbers of Polar cod arrive in certain parts of the White Sea, the inhabitants regard it as a sign that there will be good seal hunting. This is somewhat analogous to the way in which the herds of seals off Newfoundland proceed southward to the Great Fish Bank before they seek breeding grounds on the drift-ice.

It should be observed that simultaneously with the gathering of these multitudes of seals near the breeding grounds in the White Sea, considerable numbers of seals may also arrive in other districts, e.g. off the Murman Coast in December and January (especially in 1902), and often in February and March also. Thus

in many years large numbers of seals came to Ribachi Peninsula from January to April.

The people there consider that these seals come from the north, "from Spitsbergen." Many of the female seals are pregnant; newly born pups have also been found on the shore, but it is uncertain whether these belonged exclusively to the kind of seal in question. At times the herds cover large areas of ice. One report states: "As far as the eye can see." According to information given by some Russians, the saddlebacks also assemble in the late autumn in Cheskaya Bay, east of the Kanin Peninsula.

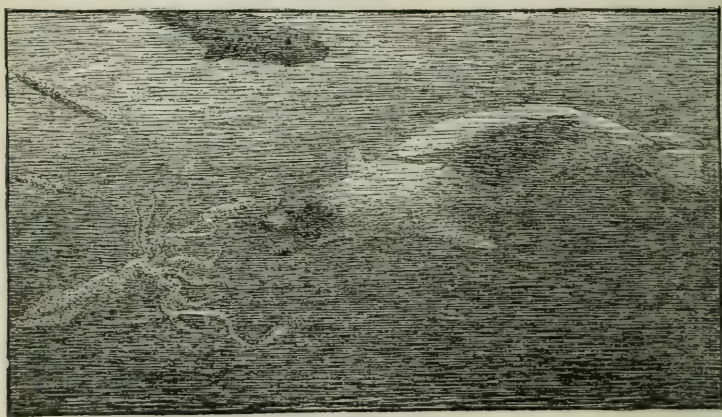
During the period between the middle of February and the end of March, the young ones are brought forth on the ice. The males are also present at the breeding grounds for the purpose of mating, which takes place on the ice about three weeks after the birth of the young ones. According to a Russian source (Smirnov) the earliest mating was observed on March 10th. After mating comes the moulting, which may last from the beginning or middle of April to the first part of May.

From the beginning or middle of April to about the middle of May, the seals usually set out again for the north in great multitudes from the White Sea. As a rule the young ones leave first, then the older ones, and lastly the full grown seals.

Some of them proceed to the north-west along the ice off the Murman Coast to Ribachi Peninsula, and on to Varanger Fjord and East Finmark, where they usually appear during the period from April (or even

March) to June, when they disappear. They usually arrive off East Finmark at the same time as the capelan, which approaches the coast followed by multitudes of cod.

The seals that go there are to a large extent the young ones that are born in the White Sea the same year. But it is impossible to draw any hard and fast



A Saddleback Seal foraging.

line between this spring migration of seals coming from the east, and the winter migration of seals which has been discussed previously, and which the inhabitants believe to come from the north. In certain years the seals also migrate farther westward along the coast of Finmark, where the "Russian Seal" ("Russe-kobben" as it is called) is greatly feared by the fishermen because they believe that it causes great destruction amongst the fish. There were particularly large swarms of them in the winter and spring of 1902 and

1903 as far south as the coast of Vester-aalen and Helgeland, and during those years the sea was "quite void of fish." These flocks of seals mainly consisted of young seals from the previous spring, but there were also many old seals and full-grown males among them. To judge from the scanty historical records available, however, it would seem to be a very rare event for saddlebacks to go so far south along the coasts of Norway.

The majority of those that come out of the White Sea in April and May, proceed to the north-east along the edge of the ice, and as by degrees the limits of the ice recede northward and eastward, the herds of seals follow them towards the coasts of Nova Zembla and northward towards Franz Josef Land and Spitsbergen, and to some extent also into the Kara Sea.

In summer and the early part of autumn they almost disappear from the southern part of Barents Sea, and only a few solitary seals are to be met with in the White Sea or along the Murman Coast, and the north coast of Russia towards Nova Zembla.

The multitudes of seals that assemble in spring at the breeding grounds in the White Sea are very considerably less than those found on the breeding grounds off Newfoundland and in the Jan Mayen sea, and the number of seals caught by the Russians in the outer part of the entrance to the White Sea every spring is small as compared with the catch at other breeding grounds. At the most, this would amount to twenty or thirty thousand seals a year.

THE MIDDLE TRIBE

The middle tribe of saddlebacks which keeps to the drift-ice, mostly in the region between Spitsbergen, Bear Island, Greenland, Iceland and Jan Mayen, is that which specially interests us here. Its great annual breeding grounds are as a rule in the sea to the north-east of Jan Mayen, rarely south or south-west of the latter.

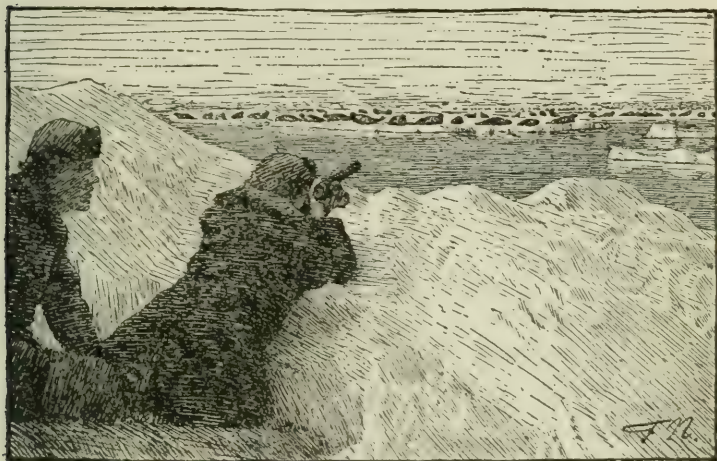
The greater part of the seals appear to come to the breeding grounds from the north-east, migrating in herds along the edge of the ice; but large numbers evidently also come from the south and south-west, from the sea near Iceland, and perhaps from the drift-ice off the east coast of Greenland even to the farther south.

Hundreds of thousands of seals assemble at this breeding ground. Besides the pregnant females, the males and also many one-year-old seals go there.

As mentioned previously, in the years when what is known as the "Ice Promontory" is well developed, the seals usually proceed thither. In the heart of this promontory, a good distance from the outer edge of the drift-ice, the females go on to the floes about the middle of March or later. They choose snow-covered ice of medium thickness, that is not so easily broken by storm and sea, and where their young ones have a little soft snow on which to lie. These floes are usually about three feet in thickness. As a rule the seals do not choose the older, thicker and more uneven floes, which are more difficult to ascend and more

easily become compact. It is also quite an exception for them to give birth to their young on bare, newly-formed ice, or what is known as bay-ice.

The young ones are born during the period from the middle of March to the beginning of April. This is from three to four weeks later than the time when the majority of young seals are born in the White Sea, and half a month later than off Newfoundland.



Hunting adult Saddlebacks.

In chapter VII, the breeding grounds of the saddleback in the Jan Mayen sea will be described, so I will not enter upon this subject at present.

If the seals are frightened by seal hunting during the time when the pregnant females begin to lie up on the ice, they may enter the water again and seek other ice. The seals are thus scattered and as a rule fewer young ones are then caught.

It was for this reason, amongst others, that in 1876

an international agreement was concluded between the nations that engaged in sealing in the region of Jan Mayen, by which the hunting of Greenland seals and bladdernoses in the region between Lat. 67° and 75° N. and between Long. 5° E. and 17° W. may not begin until April 3rd.

It will readily be understood that the result of this agreement was not so much that the seals were spared, as that the catch was rendered larger and more certain, the seals having time to gather in peace on the ice and give birth to their young ones. It thus became possible to kill far more when the slaughter began after midnight on April 3rd.

Towards the end of April, the multitudes of seals at the "Jan Mayen breeding grounds" begin to disperse. The young ones of that year ("bluebacks") set off in herds towards the outer edge of the ice where there are plenty of crustaceans in the water, and here they frequently mount the "streams" of small ice that are detached from the more compact edge of heavier floes. The Norwegian sealers therefore call these bluebacks "stream youngsters."

The majority of adult seals proceed to the north and north-east along the edge of the ice, while some of them also go southward to the sea south-west of Jan Mayen, and many of them every spring and early summer visit the banks off the coast of Iceland.

This species of seal appears to have been quite common on the north coast of Iceland, particularly before the middle of the last century. It is said to have become scarcer after that time, and this is held to be

due to the large numbers caught in the Jan Mayen sea. To judge from various accounts, these seals often went right up to the coast and into the fjords in very considerable numbers in spring, from the end of April to June, and sometimes in July. They are also found off the coast in winter, and frequently begin to appear in the autumn, in November or earlier. The pregnant females are said to leave the coast early in March and return in the middle (?) of April.¹

After the seals have left the breeding grounds, they begin to moult at the end of April and in May. The old seals congregate then on the ice in large numbers. As mentioned previously, it is especially these "he-seal" flocks as they are called, that are hunted during this period. Naturally there may also be females among these male seals, and a few young seals, known as "gray bitches."

When the moult is ended, the seals disperse in rather small herds over the drift-ice in the whole of the vast expanse of sea east of the east coast of Greenland, from Denmark Strait, or farther south, and Iceland northward towards Spitsbergen, and also most probably in Barents Sea. Presumably they live in those regions the greater part of the year, until they again begin to assemble at the breeding grounds in the following spring.

At the end of May and in June, the seals become so thin that they are scarcely worth hunting, especially

¹Cp. B. Sæmundsson's "Reports Concerning the Occurrence of the Greenland Seal off Iceland in Early and Recent Times," *Norsk Fiskeritidende*, 1903, Part 7.

as they are then more scattered and timid. During the autumn they again become plump.

As stated above, it is probable that seals of this middle tribe also enter the Barents Sea, at least its western part. At times quite large numbers of saddlebacks are seen on the ice between Spitsbergen and Bear Island, and the circumstance that bladdernoses are found there at the same time, while the latter are not found in the Barents Sea, may indicate that they all come from the west.

In the blubber of old seals shot in the Jan Mayen sea, there are sometimes found large lead shot that have not been moulded but cut from the lead. Now shot is never used by sealers when shooting seals in those waters. It would be interesting to learn where such shot is used. Possibly it may come from the Russians in the White Sea or the north coast of Russia. In that case these seals must have come from that district. But of course it is also possible that this shot comes from Iceland or from the Eskimo on the west coast of Greenland, or people in Labrador or Newfoundland, if that kind of shot is ever used in those places.

It is difficult to understand why the saddlebacks make their long migrations every year to the breeding grounds in order to give birth to their young ones on the ice. It might be thought that they could easily find safe ice for the purpose nearer to the districts in which they spend most of their time.

Thus a seal that travels from the northern west

coast of Greenland and from Baffin's Bay to the breeding grounds off Newfoundland, south of 50° N. covers a distance of from three to five thousand miles.

The migrations of seals to the breeding grounds in the Jan Mayen sea and the White Sea are not so long, but even there they travel more than four thousand miles there and back.

They cannot travel so far in order to avoid their enemies while bringing forth their young, and mating; for the grampus, their worst enemy next to man, is not less likely to be met with at the breeding grounds, e.g. in the Jan Mayen sea and off Newfoundland, than where these seals otherwise live; and there are usually many Polar bears, for instance at the breeding grounds in the Jan Mayen sea.

Is it with a view to food that they choose certain districts for their breeding grounds?

This can hardly be the case as regards full-grown seals, because they eat very little during the breeding and mating season and when moulting.

As we have seen, large numbers of seals undoubtedly go to the Grand Bank off Newfoundland before the breeding season, and many seals enter the White Sea in pursuit of the shoals of Polar cod one or two months before breeding begins; but in both regions a number of the seals undoubtedly come from great distances directly to the breeding grounds, without going to the Bank, and moreover near the grounds in the Jan Mayen sea there is no special abundance of fish for the full-grown seals to find. If the seals were in search of fish, they would have to go far south towards Ice-

land. The greater part of the seals, however, come to the breeding grounds from the north-east. On the other hand, it is probable that in the neighborhood of the breeding grounds it is especially easy for the young seals to find large quantities of pelagic crustaceans, and other small creatures that they require during the important time after they first enter the water and begin to feed themselves. It is a striking fact that it is precisely in the spring, in April and May, that there are large quantities of these creatures, and of the small plants (algæ) upon which they exist, in the upper layers of water near the seal's breeding grounds in the Jan Mayen sea and east of Newfoundland, and also in the White Sea.

The Polar water that is borne southwards by the Polar Current contains many substances that are indispensable to vegetable life. Some of these are carried into the Polar Sea in the river water from Siberia and Canada, and possibly are also stored up in the seawater, by special processes, without being used, for there is no vegetable life worth mentioning in the inner Polar Sea, where the thick ice that entirely covers the surface absorbs the greater part of the sunlight before it reaches the water beneath. Without sunlight there can be no vegetable life, and without vegetable life there can be no animal life.¹ But when

¹We sometimes find people, even experienced Polar explorers, who speak of the animal life under the ice of the North Polar Sea as being so abundant that human beings could live on it by collecting the crustaceans in tow nets. This is an error. There is a wealth of vegetable and animal life in the sea along the outer edges of the Polar Sea, and in the drift-ice where there is a great deal of open water, but in the inner areas of that sea there is extremely little life.

this Polar water reaches the outer edge of the drift-ice and the sunlight gains access to it in spring, (while the covering of ice disappears and the water is slightly warmed by being mixed with the water of the Atlantic, there is an amazing growth of vegetable life (chiefly microscopic algæ, especially diatoms, of various kinds) in the upper layers of the sea, and this sometimes turns the water quite brown or greenish-brown.

Upon these plants subsist a multitude of small animals, especially small pelagic crustaceans, which develop there in great numbers. There are so many animals and plants in the sea, that if a tow net with a fine mesh is dragged through the sea it becomes choked with them in a few minutes.

It is upon these crustaceans that the young seals ("bluebacks") live during the first period, in April and May, the very time when this pelagic vegetable and animal life (plankton) blossoms into its great annual growth in these parts of the Jan Mayen sea where the Greenland seals choose their breeding grounds.

Here, as I have mentioned already, there is a great vortical movement in the sea, and great quantities of Polar water are carried out from the ice and mixed with the waters of the Atlantic. In this way particularly favorable conditions are created for the development of the plankton life when the sunlight reaches it outside the edge of the ice-fields. We have also seen that the young seals, as soon as they enter the water, proceed to the outer edge of the ice, and on to the "streams" of ice beyond.

Similar conditions prevail to the east of Newfound-

land. The volume of water carried by the Labrador Current originally comes from the sea to the north, which is covered by ice in winter, and from the ice-covered sounds between the islands north of Canada. This water, when freed from ice and mixed with the waters of the Atlantic east and north-east of Newfoundland, also provides the conditions necessary for a rich growth of plankton life (plant and animal life) along the outer edge of the Polar Current, when the sun returns in spring.¹ In those more southern latitudes, this growth will probably begin earlier than it does near Jan Mayen. If so, that would also explain why the seals' breeding season occurs at an earlier date.

If this reasoning is correct, the long migrations of the Greenland seals are undertaken in order that the young seals may obtain specially favorable conditions for development during the first critical months of their lives. They would somewhat resemble the wanderings of many other animals, e.g. of fish to the spawning grounds, or of migratory birds towards the north to nesting places, etc.

It may be objected that this attempt at an explanation cannot apply to the breeding grounds in the outer part of the White Sea, since there is no Polar Current there. But this enclosed sea receives instead large masses of flood water from the rivers, which contain precisely the substances indispensable to marine vege-

¹The same fertile water reaches the Newfoundland Banks, and I am inclined to believe that it causes the wealth of fish there, for it provides for the young fish specially favorable conditions of nourishment that are of importance for their development. This may be the reason why the cod resort to these banks for their spawning.

table life in these waters during the spring. Moreover, since the melting of snow on land in Russia takes place comparatively early, and earlier than the melting of snow and ice in the Polar Current at Jan Mayen, it is not unreasonable to infer that the growth of plankton, and consequently the seals' breeding time, also occur at an earlier date.

The breeding grounds usually lie some distance in among the drift-ice. In order to find them the sealers must arrive at the edge of the ice sufficiently early in March to see the seals migrating in the water. The direction taken by the herds of seals as they migrate gives the sealers an indication of where the breeding grounds may be sought.

If the great "Ice Promontory" is well developed, it is preferable to go north of it to "The Great Bight." As most of the seals come from the north-east along the ice, they cross this bight on their way to the "Promontory." It is important, therefore, to see them migrate and to follow them through the ice.

But the whole matter is not as simple as it may appear on paper. The Arctic Ocean is large, and one year is not like another. The ice may form in extremely different ways, and the situation of the breeding grounds may vary greatly from year to year. Nor is the migration of the seals in the water always to be relied upon. And lastly the ice may be compact and difficult to navigate in the region where the seals have settled down.

It will therefore be easily understood that of the many ships that used to seek the breeding grounds

every year, only a minority found their way thither. In hardly any year did all enter the breeding grounds. A successful Arctic navigator was one who reached the breeding grounds in the greatest consecutive number of years. This was the test of a man's worth. But there were many unfortunate skippers who entirely failed to get there, and the seals lie so locally on the breeding grounds that as a rule their ships caught no "white-coats" at all.

IV

ON THE TRACK OF THE YOUNG SEALS

DURING the following weeks we cruised indefatigably backwards and forwards along the edge of the ice and in and out through the ice itself in search of the young seals.

Throughout this search the honor of the seal-hunter is almost as much at stake as his livelihood. If nobody succeeds in finding the young seals, well and good; but if the others find them while you yourself fail to do so it is felt as an irretrievable defeat.

The search involves keeping a sharp look-out for other vessels no less than for the seals themselves.

When a herd of seals is lying on the ice you can see them a good twelve miles off in clear weather, with the aid of your telescope up in the crow's nest; but the tops of a ship's masts, and still more the smoke from her funnel, are of course visible at a much greater distance, and if you notice that a vessel has penetrated far into the ice there is every reason to infer that there are seals there.

On *Monday, March 20th* (air temperature 32° to 28°) we were approximately in $70^{\circ} 20' N.$ and $3^{\circ} 37'$

W., that is to say about 34 miles to the east-south-east of Jan Mayen.

In the morning we passed through a large ice-promontory. Looking out from the masthead I failed to detect any opening in the shining white mass of ice, which extended as far as the eye could reach. We steamed on all that day, until at last we entered rather more open water.

Late in the afternoon we sighted a ship. This turned out to be the "Jason" of Sandefjord, which was lying to and waiting for us.

Captain Maurits Jacobsen came aboard. He had not reached the ice any sooner than we did, although he had left Sandefjord as long ago as March 4th. The "Jason," like our own ship, was a new boat and was on her first voyage. Six years later this ship, with the same captain, took me to the east coast of Greenland when I was going on my expedition across the inland ice.

As the evening wore on the barometer began to fall ominously (28.88 in. at 8 p.m.), while the wind, which had veered round the wrong way, from the east to the north-east, rose rapidly. It looked as though we were in for a storm.

The captain altered our course to bring us into the ice again. This seemed rather a hazardous proceeding, but on the other hand if we remained out in the open sea we should drift too far out of our course.

Before we had sailed far the storm burst upon us; the gale whistled through the rigging, and violent gusts repeatedly struck the ship. We were obliged to furl

one sail after another until only the close-reefed top-sails remained.

A heavy sea soon got up, and came sweeping in through the loose ice.

Our grey-bearded mate did not like the look of things; he paced up and down the deck shaking his head and exclaiming again and again:

"It won't do! It won't do! I call this foolhardy sailing."

All the same we managed to flounder in through the ice, cannoning from one flow to another as the ship worked her way onward in the dark, almost of her own accord.

Our chief anxiety was the heavy swell; it was rapidly growing rougher, dashing the floes against one another and heaving them up on end.

The captain's orders rang out clearly above the din and turmoil, and were smartly obeyed. All hands were on deck now, for it was anything but comfortable to remain below.

On through the ice we went. The floes were knocked over, smashed, crushed beneath the ship, hurled aside—nothing could withstand our onset.

Suddenly a huge white hummock of ice loomed out of the darkness ahead of us, threatening to make a clean sweep of the davits and all the rigging on one side of the ship. In a moment it would take the foremost boat on the port side.

"Hard a-port!" shouted the captain; the boat was hastily dragged into safety on the deck, and we slid past the hummock without any mishap.

Then a towering sea advanced from the weather side and dashed itself violently against the ship. Crash! The vessel heeled over. Another crash, and the bulwark port was hurled on to the deck; the bulwark was broken on both sides.

But as we passed farther in through the ice the sea began to grow calmer and the noise subsided, though the gale still howled in the rigging with more fury than ever.

We had run a great risk but had got through all right, and now we lay as safely as if we were in port.

Meanwhile the storm had increased to a hurricane. I sat up all night reading and listening to the wind whistling and screaming aloft. Now and then an ice-floe would bump against the side of the ship. This was the Arctic Ocean in all its grim fury. But what could be more pleasant than to sit in a comfortable, lamplit cabin with an entertaining book while the storm without raged and tore in impotent anger.

Towards morning the glass began to rise again (it had gone down to 28.65 in.) and the storm showed signs of abating.

The captain told me next day that he had not experienced such a violent storm in the Arctic since 1874, I think it was.

When I went up on deck in the morning (*Tuesday, March 21*, by reckoning $70^{\circ} 51' \text{ N. Lat.}, 5^{\circ} 36' \text{ W. Long.}$) the sun was shining on the white expanse of ice around us. The breaches in the bulwarks gaped in the daylight as a visible reminder of the stormy night. A stiff gale was still blowing.

This was a real sample of the life in the Arctic Ocean, where these tussels with the ice are an everyday occurrence. To quote the words of a seaman who had sailed with old Svend Foyn through the ice: "We forged ahead through it—sweeping along through bay-ice and hummocks—saw our lee cat-head carried away—was standing myself on deck at the time—didn't let on."

Generally you get through all right, but not always.

It had grown rather colder, $26\frac{1}{2}^{\circ}$ in the air, while the water was 29.32, i.e. very near freezing-point.

All that day and a good deal of the next day (*March 22*, by reckoning $71^{\circ} 19' N.$ Lat., $3^{\circ} 8' W.$ Long., wind NNW) we went on through the ice, but in the afternoon we got out again into open sea with a few floes drifting here and there. The air temperature over the ice had fallen as low as $7^{\circ}C.$, but out here over the surface of the sea it grew rather warmer.

The water became warmer too at some distance away from the edge of the ice, rising to 33.4° , whereas it was 30.9° and $29.8^{\circ} C.$ nearer the ice.

We were still too far south to find the young seals, so we made our way through the ice in a north-easterly direction, sometimes passing through ice-promontories, at other times navigating open water. Occasionally when we got into heavier pack-ice we would lie hammering against it without making much headway. Then again it would open out a bit.

Up in the crow's nest the long telescope searched untiringly for seals or craft engaged in sealing.

Further, a constant look-out was kept from the deck

for seals in the water. The great thing is to sight herds of them, for they are almost sure to be migrating to the place where they will bring forth their young, and the sealer can therefore follow in their track.

There in the east-south-east was a vessel! She was sailing close-hauled in the opposite direction to ourselves, under steam, as well as sail. She went about, doubtless to see who we were, then about again and continued on her course westward. Evidently one of the English sealers—was she the “Eric,” with Captain Walker, one of their best men, or was she the “Hope”? And why on earth was she going west?

We sighted another bark to windward in the north-west, and thought it was the “Albert” of Tönsberg.

Skinning-knives and sharpening-steels were served out to all the men. Next to the seal-club, with which the young seals were killed, the skinning-knife is the sealer’s chief weapon. It is usually flat and broad, and not unlike an ordinary bread-knife. Each man carefully sharpens his own knife, first on a grind-stone and then on a good hone, and when it is in use he constantly whets it on the sharpening-steel as a mower whets his scythe. The knife must be kept sharp if it is to skin expeditiously and account for the maximum number of seals in the day.

A wooden sheath must also be made for this knife, so that the sealer may carry it safely, together with the sharpening-steel, in a rope-belt round his waist.

Frequent consultations took place in the mates’ cabin between the captain and the two mates, as to the course we should steer.

Have the seals gone east or west?¹ Should we alter our course to south-west along the ice towards Jan Mayen, or should we continue in a north-easterly direction?

There was a good deal to be said for getting as far north as possible, where we could see the seals in the sea. But we wished we knew exactly where we were; we had not been able to take any observations for many days past.

It was agreed that we should continue on the same course for the present, at any rate as far as 74° N. Lat.; and as the wind was still light we should have to get up steam early the following morning; it was no use trying to economize coal as long as we were searching for the young seals.

We wondered if any of the other ships had already found the seals. It did not seem at all likely. Indeed we began to think that we were among the leading vessels. We had already sighted several of the best boats, including one of the smartest of the Englishmen, and the "Jason," which was no mean sailer, had not got any farther than we had, although she left home a week before us.

The vessel that lay to windward of us looked like the "Isbjörn" (Polar Bear), which left Tönsberg on February 28th and had an uncommonly smart captain too.

¹The sealers as a rule speak only of east and west along the edge of the ice, both in the sea around Jan Mayen where we were, and in Denmark Strait. It would be more correct to speak of north-east and south-west, but they go by east and west as shown on the compass, though the variation is two and a half points in Jan Mayen and more than four in Denmark Strait.

The young seals were the hub round which our existence turned, night and day alike. We experienced all sorts of premonitions and signs and feelings of the direction in which they were to be found. But who knows? Perhaps they had been scattered by the recent storm.

As we sailed on in the night one or another would hear the young seals crying on the ice; but it was all imagination.

The nights were still dark in March, but we had the light of the moon to help us on our way.

In the evening of *Thursday, March 23* (31.8° , wind SSE.) the weather cleared up.

It was like entering fairy-land to steam on through this moonlit world of ice, with the glittering white ice-floes, the black sea, the moon's shining disk, the stars—and the everlasting stillness enfolding it all.

Then the day broke with glorious sunshine and a southerly breeze; and with swelling sails we swept on at the rate of twelve knots in smooth water among loose ice-floes which the ship thrust aside or smashed to atoms with her bow.

At last, on *March 24*, (stiff breeze from S and SE), we succeeded in taking some useful observations and found that we were in $72^{\circ} 18' \text{ N.}$ and $3^{\circ} 28' \text{ E.}$ So we could still continue sailing north-east for the present.

It was not very cold; most of the time it kept at two or three degrees below freezing-point.

On Saturday morning, *March 25th* (27° to 30° , gale from E and later WSW) we entered a stretch of bay-



Night in the drift ice.

ice which was nearly two feet in thickness. It seemed to have frozen over quite recently, for the floes lay edge to edge, as though the sea had just split them apart. A thick layer of snow covered them, and not many hummocks were visible; it looked as though there had been open water here before this ice formed. We worked our way northward through it all that day.

Our impatience increased as every hour brought us nearer to April 3rd, the date when the sealing would legally begin.¹

Should we continue on the same course? Where was "The Great Bight" this year? Was there any "Great Bight" at all, or was it this tract covered by bay-ice that we had been traversing? Would there be 'east' or 'west' seals this year?

These were the questions we debated again and again, with increasing frequency as the days passed by.

On one point, however, all were agreed: it was a fatal thing not to arrive in time to see the seals in the water.

The captain and I were smoking a pipe of peace together after dinner in the saloon, when we suddenly heard the man at the wheel overhead shout the word "seal!" The sound of the magic word brought us on deck in an instant; but we were too late. The man had seen a seal in our wake, but he was new to the Arctic and could not tell us what kind of seal it was, or its sex. The regular sealers can at once see the difference even if nothing but the head shows above

¹As mentioned in Chapter III, p. 86, the catching of seals before April 3rd was prohibited.

the water, this is true even of the saddleback: "The female's head is narrower, like," and lighter in color.

We went below again to our pipes and the comfortable sofa. Presently we heard the men on deck talking about another seal, and this time one of them came to tell us that there was a female bladder-nose off our port bow.

We went on deck again, and there on a floe several hundred yards away from us lay the first seal I saw lying on the ice. The captain at once gave the order to stop. She looked big and fat and strangely obese as she lay there calmly gazing at us.

A male seal, easily recognizable by the hood above his muzzle, now stuck his huge head up out of the water near the floe.

A second suitor came into view a little way off, keeping at a respectful distance from his larger and more powerful rival. Presently he got up on the ice, and now and then waddled cautiously a step or two nearer to the female.

She looked so saddlebacked that the sailors thought she had already had a young one and deserted it.

Several more seals were sighted in our wake, but they did not let us see what kind they were this time either.

Later on in the afternoon we saw a whole family of bladdernoses: the female, her young one, and the male. And in another direction we sighted a second family.

We took counsel again. The signs were favorable; the bladdernose was always met with near the breeding ground of the saddlebacks, said some; generally to

the east of it, several miles away, said others. Though in such and such a year it had been met with south of the breeding grounds—and the same thing happened in another year, too—but there were special reasons then; for as soon as the seals had begun to go up on the ice (meaning the saddlebacks on the breeding grounds) they had had to move away to the edge of the ice because it was so cold that they were on the point of being frozen up (i.e. by the channels and cracks freezing over, so that they could not get into the water).

Finally it was decided to stay where we were for the night and see whether the morrow would bring further signs of seals in the neighborhood. We thought we were now approximately in 74° N.

The morning of *Sunday, March 26th*, duly arrived, but there was nothing to give us any fresh information, except the tracks of a bear which had been quite close to the ship during the night. One man thought he had seen it in the darkness, but he had refrained from saying anything for fear it was only imagination. Scandalous omission!

We continued on our course in a north-eastward direction through the same bay-ice. The weather was quite fine; there had been rather a stiff south-westerly breeze in the evening, but the wind had now gone round to the east, and the temperature was $26\frac{1}{2}^{\circ}$.

In the morning it was sufficiently clear for us to obtain an observation for the longitude, but no midday altitude. Calculating with the latitude (74°) by dead reckoning our observation gave us about 9° E. Long.

Could that be right? The ice never stretched so far to the east as that, and the young seals were never found so far east either. The chronometer must have gone altogether wrong.

Another council of war was held in the mates' cabin in the afternoon. Were the seals east or west? Probably they were to the westward, most likely west of the place where we had seen the bladdernose; if they were farther to the east, and we sailed off to the west it would be deucedly annoying.

On the other hand if we went east and the seals happened to be somewhere in the west we should not be in time to reach them by the 3rd of April, when the slaughter began. It was very difficult to decide.

At this juncture Oran, the second mate, came in from the deck and entered quietly. With a sly smile he said: "I've got some news for you; there are two vessels to leeward."

This roused fresh hopes. All hands on deck to have a look—at any rate we should find out where we were.

We put on full steam and sail and hurried northward to catch them up, while several went up aloft to see what vessels they were.

The nearer of the two had double topsail yards. The only Norwegian vessel which had this was the "Vega"; and the only English vessel so rigged was the "Labrador," but she had not sailed in these parts of recent years.

Soon she was recognized as the "Vega," and finally we came alongside of her at ten o'clock in the evening. The captain went aboard her to find out the latest news.

This was the same "Vega" in which Nordenskiöld had navigated the North East Passage three years earlier. She looked a fine boat as she lay there, with her lofty, slender rig looming dark against the overcast sky, just where the moon was breaking through the clouds. As I stood looking at this famous vessel it made me smile to listen to the comments of the sailors.

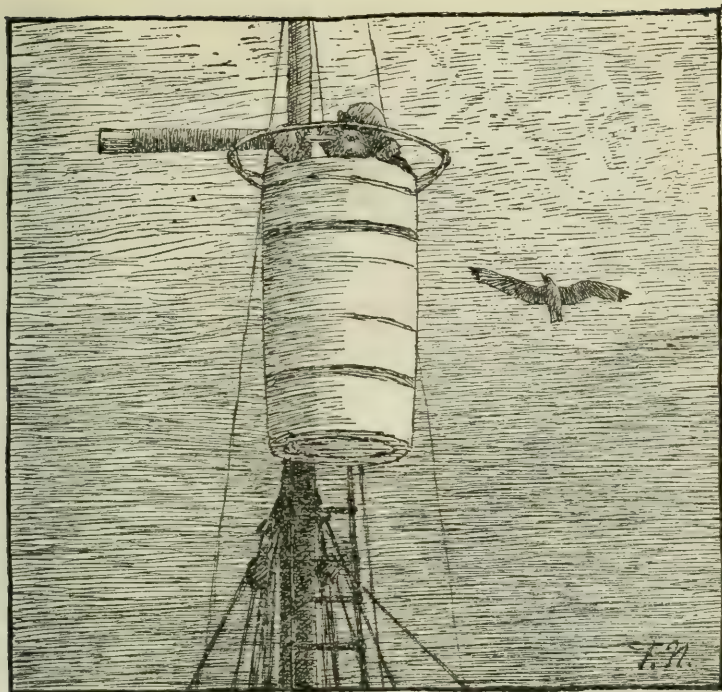
"She's done a bit of voyaging." "Ay, she's had her fair share of bean-feasting." "I wish I'd been aboard her when she was at Naples, lad! A friend o'mine, you know Gabriel, don't 'ee? was in port there on another ship when she came, and he never see such a to-do, what with fireworks and firin' salutes an' all."

The deliberations with Captain Markussen on board the "Vega" took a longish time, and our captain did not return until the small hours of the morning.

It turned out that our longitude the day before had been correct after all. They had arrived at the same result on the "Vega" and also the "Capella," from which they had just parted. Relying upon this the "Capella" and the "Vega" had each killed a young bladdernose, as they were east of Long. 5° E., the eastern limit of the area within which close time remained in force until April 3rd.

On this day, *Monday, March 27th* (30° to 32°), we obtained some reliable altitudes, and found that we were on $74^{\circ} 50'$ N. and $8^{\circ} 20'$ E.

With a stiffish south-easterly breeze we sailed northward at a good rate. The "Vega" sailed better than the "Viking"; she passed us and assumed the lead. We



On the lookout for seals.

intended to continue northward in search of the Great Bight, although to the best of our knowledge we had already got farther north than the young seals had ever been found.

The other ship that we had seen turned out to be the "Nova Zembla," a Scotch sealing vessel from Dundee, which followed us as fast as steam and sail would carry her.

The margin outline of the ice was now curving unmistakably towards the north-west, but we could not yet be certain that it was the "Bight."

I ascertained that the water-temperature was 29.3°

at noon, 29.6° at 2 o'clock, and 29.8° at four o'clock, all these temperatures being taken in open water with a few pieces of ice floating about in it.

I climbed into the crow's nest to have a look at the ice. While I was up there a furious squall suddenly descended upon the ship. It fairly whistled in one's ears, and its force made the vessel heel right over. The topgallant and all the other sails were set, and it was impossible to furl them. The mast and the crow's nest rocked ominously. The topsails began to shiver, as the ship was run up into the wind, and the mast shook like a reed.

Both the "Vega" and the "Nova Zembla" were lying far over, and all three vessels had now to bear away.

Our captain watched the mainyard anxiously; it bent outward until it looked like a bow, and he began to fear that we should lose the rigging altogether.

Meanwhile I was still sitting up in the crow's nest unconscious of the danger, and the captain did not know that I was there. Markussen told me subsequently that he had been standing on the "Vega" watching us, and had never seen such risky sailing in his life.

When I came down the wind was so biting cold that it felt as though I had no clothes on my body. By the time I reached the deck I had lost all feeling in my fingers; they were as stiff as wood and I had to beat them for all I was worth to restore the circulation. The captain was much alarmed when he saw me coming down the rigging.

Later on in the afternoon the "Nova Zembla" ran alongside, and Captain Guy came aboard. As usual a council of war was held to discuss what we should do next, and the direction in which we should most probably fall in with the young seals.

The Scotch skipper was rather down in the mouth. In his opinion there was not much hope of finding the young seals, as we had not yet done so, and if he failed to get any seals that season he would lose his ship. So the prospects were none too bright.

But he cheered up after a while, and began to relate his experiences and adventures in Davis' Straits and Baffin's Bay, where he usually went whaling. Here there were some seals which he called "ground seals," and others "floe seals," which lay their young in passages under the snow on the sea-ice, usually on one of the largest hummocks; close to her young one the mother has a hole by which she can go down and come up from the sea.¹ The Eskimo will squat down by one of these holes and wait there with his short harpoon held in readiness; as soon as mother seal pokes her nose up he drives the weapon into her and when she is thus harpooned he has no difficulty in pulling her up. After that he proceeds to take her young one under the snow as well.

Captain Guy had seen the polar bear lying in wait by these seal-holes in a similar fashion. The animal lies outstretched on the ice, with his paws close to the

¹This is obviously *Phoca hispida*. The Scotch sealers usually call it the "floe-rat." The "Ground-Seal" is *Erignathus barbatus*.

hole in readiness to strike the moment the seal's head emerges.

He had also noticed how a bear would sometimes play with the young seals if there were many of them about, as there are on the breeding grounds. Thus the bear would bite one of them and then throw him away without killing him, repeating the same thing with the next, and so on.

Sometimes the animal would throw a young seal up into the air and catch him again in his mouth; then give him a cuff which sent him rolling along over the ice; after which he would treat another in the same way.

It was exactly like a cat playing with a mouse.

On the other hand if seals are scarce the polar bear wastes no time over such frivolities but sets about eating his prey at once.

Guy told us they had often encountered walruses over there in the west, and in certain places they were quite numerous. He also told us a great deal about the whaling. They used only to hunt the Greenland whale, of which there were still a few in Baffin's Bay and Lancaster Sound.

These whales, which are fond of lying in the small open ice, are always harpooned from rowing-boats. You row quietly up to them and shoot the harpoon from a small gun placed in the bow of the boat.

When the whale is hit, he will usually dive straight down and remain about half an hour under water; after that there is not much life left in him, the boat can be run alongside of him when he rises, and he is dis-

patched with a long lance. Occasionally, however, he may hold out for two or three hours.

Unless the whales are of large size and yield long whalebones, eleven or twelve feet in length, it takes four or five whales to make the expedition pay; but you seldom can catch so many. Captain Guy told us that he had only succeeded in killing two whales in the previous year.

There is a lot of blubber on a good whale—some eighteen or twenty tons, or even more—but the whalebone is the most valuable product all the same. A large whale will yield as much as one and a half tons of whalebone, worth several thousand pounds.

Captain Guy had often come across narwhal in the waters to the west, and he promised to send me the skeleton of one if I would write to Dundee and remind him.

As the day wore on we frequently sighted both bladdernose and saddleback seals, usually in the water, so we stayed where we were during the dark hours of the night in order to have a better look round by daylight next day.

Early next morning, *Tuesday, March 28th*, (30° to $17\frac{1}{2}^{\circ}$) we proceeded on our way at a good speed, using steam as well as sail. The wind was blowing from the east, and as far as possible we shaped our course westward into the ice. The two other vessels were obliged to follow in our wake, as we had a more powerful engine.

By and by we encountered more difficult ice, and a

fog came on as well. During the rest of the day we alternately lay to on account of the fog and sailed on a little when it lifted. But we saw a good many seals in the water from time to time.

At noon the reckoning showed that we were approximately in $74^{\circ} 55' N.$, and $4^{\circ} 53' E.$

Captain Markussen and Captain Guy came on board again and joined in another council of war. The experts now seemed to agree that the breeding grounds, or at any rate *a* breeding ground, were situated west or south-west of where we lay; this could be inferred from the fact that there were so many seals in the water, and that they seemed to be inspecting the ice with a view to going up on to it.

No doubt there had been open water here when the main body of the seals migrated, and very possibly their breeding grounds were away to the south-west.

The stragglers might have chosen a breeding-ground somewhere to the north or north-west of us, owing to the floes being cemented together by the formation of bay-ice.

The general feeling was that we ought to proceed in a westerly direction, if we could; but unfortunately the ice was too heavy there.

That evening we sighted five vessels in the south; we were getting quite thick on the ground now!

I took the temperature of the sea at various depths in the course of the day, and obtained results which seemed to be rather remarkable. At 1 p.m. the temperatures were as follows:

on the surface.....	29.1°
at 10 fathoms.....	28.9°
“ 20 “	28.6°
“ 30 “	29.1°
“ 50 “	29.7°

The air temperature was 30.9°. It had been colder during the night, being 26½° at midnight. Everywhere on the surface of the water between the floes small, thin “plates” or “flakes” of newly-formed ice was floating, from which one might infer that the water had been coated over with ice earlier in the day, but that this thin layer had been broken up into these small round disks by the motion of the surface water.

At 8 in the evening I took some more water temperatures, but could not get lower than 10 fathoms because the vessel was drifting too fast. The temperatures registered were:

on the surface.....	28.8°
at 10 fathoms.....	28.6°

The air temperature at the same time was 17½°, and a thin layer of ice had again begun to form on the water.

Even at that date I find an entry in my diary to the effect that these temperatures “are utterly incompatible with” the theories regarding the formation of ice at sea which were then current among geographers and physicists, theories, we may add, which are still held to a certain extent today.

The Swedish physicist Professor E. Edlund had formulated a theory that sea-ice, especially when it is

found out at sea a long way from the land, does not as a rule form on the surface of the water but at some distance below this. In the case of ice on the deep sea, more particularly, the depth below the surface is considerable, certainly more than 100 ft.¹

It is well known that ordinary sea-water, as it cools, contracts more and more until it arrives at a temperature which is below its freezing-point. Sea-water with a salinity of about 35 per thousand, as is usual in the northern seas, will freeze at a temperature of about 28.6° , while it becomes heaviest at 25.7° , if it can be cooled to this point without freezing; but there is only a slight difference in density at these two temperatures, viz., one unit in the fifth decimal place of the specific gravity.

The result of this process of contraction is that the water on the surface of the sea, as it gradually becomes colder, becomes also increasingly heavier than the warmer layer of water beneath it, provided that the salinity of these layers is approximately the same.

It stands to reason, therefore, that the surface water will continually sink and be replaced by warmer water rising from below.

As the water grows colder this process will continue until the temperature of all the layers from the top downwards (provided the salinity is identical) has fallen almost to the freezing-point of sea-water.

Up to this point the argument is correct and cor-

¹E. Edlund: Ueber die Bildung des Eises im Meere. Poggendorff—Annalen der Physik und Chemie, Vol. 121, 1864, p. 549 Cf.

O. Krümmel: Handbuch der Ozeanographie, 1907, Vol. 1, p. 499.

responds with the actual facts as we have ascertained them in more recent times by our accurate observations.

But sea-water, even when it is subjected to a strong process of cooling, does not readily crystallize into ice unless it comes into contact with some solid body or with already existing ice. Consequently Edlund thought that the water on the surface of the open sea when it is devoid of ice will, as a rule, be under-cooled (i.e. cooled to a temperature below its freezing-point) without actually freezing, if it is subjected to a strong process of cooling, and it will sink, giving place to warmer and lighter water from below; this latter will then in its turn be under-cooled and sink, and so the process will continue.

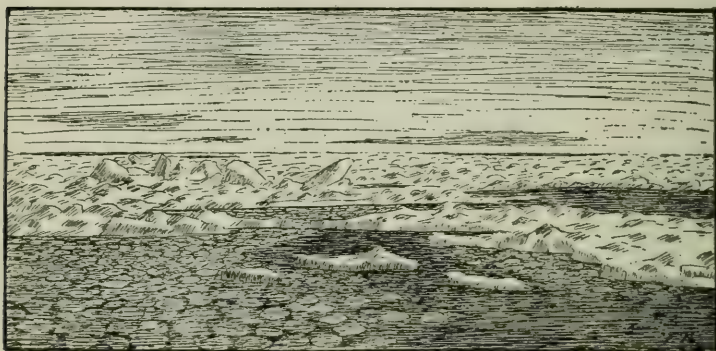
A large quantity of under-cooled water having collected in this way at a depth beneath the surface will suddenly and for some unknown reason freeze and form flat, usually disk-shaped, flakes of ice like "plates" or the larger "cask-ends," which then shoot up to the top, where they very quickly spread all over the surface of the sea. This would be what the fishermen along our coasts call "ground ice".

It is clear that Edlund favored the explanation that this undercooled water, on coming into contact with the bottom of the sea, suddenly turned into ice; hence the term "ground ice." But he could hardly have believed this in regard to ice which forms out in the deep sea, and as a matter of fact he confined himself to the statement that it must be formed at a great depth.

The truth of this theory has, it is claimed, been confirmed by the observations of fishermen on the coasts

of Norway and Sweden; they are said to have frequently seen these disks of ice rise from the deep and cover the whole surrounding sea so suddenly that the boats remained frozen fast in the "ground ice."

The formation of the bay-ice or pancake-ice in the Arctic Ocean was evidently put down to this cause (cf. Quennerstedt, 1867), although Scoresby (1820) had already given the right explanation of its formation.



Pancake ice forming in a lane.

When we consider the explanation it cannot but strike us as wholly anomalous that ice which is formed deep down in the sea should assume the shape of very thin and perfectly flat disks exactly resembling the ice that is formed on the surface of the water. One can hardly suppose that this under-cooled water freezes upon a flat surface in the depths of the sea.

It is doubtless true, as Edlund maintains, that the water may freeze at first into small, thin flakes, but these are simply crystals and no one can seriously suggest that they are capable of expanding to the size of plates or cask-ends.

One could better understand it if the crystals in the deep under-cooled water were to cohere in masses of various shapes.

Even on these grounds the whole theory must strike us as being extremely improbable. The observations quoted above, which give the vertical distribution of temperature in different layers of water, and were made while the typical bay-ice—ice resembling thin plates—was actually forming on the surface, directly disproved it. A series of temperatures taken on April 23rd furnish an even more complete refutation. Not one of these temperatures shows any trace of under-cooling. The temperature of 28.6° in 20 fathoms is very near the freezing-point of water with a salinity of over 34 or towards 35 per thousand, as it must have been at that depth.

The temperature of 28.9° in 10 fathoms was slightly above the freezing-point of water at this depth, which would be near or a little under 28.8° . And 28.8° , or perhaps between 28.9° and 28.8° was the freezing-point of surface-water with a salinity of 32 to 33 per thousand.

The so-called "plates" of ice cannot be formed at any depth below the surface; they are formed upon the surface itself, and their rounded shape is caused by friction against each other in the gentle wave-movement.

I may add that since the time of which I am writing I have made hundreds, if not thousands, of observations of the temperature and salinity of the cold water layers in different regions of the Arctic and Polar Seas, at times when the surface was cooling rapidly;

yet never once have I come across under-cooled water, and I am therefore unable to believe that such a phenomenon ever occurs under normal conditions in the sea.

The formation of ice in the Arctic Ocean, along the coast of Norway, and in our fjords, is materially



Young, snow covered ice.

assisted by the fact that the upper layers of the sea in these regions are as a rule—at all events before the formation of ice has made the water salter—less salt than the underlying water; and even if the water on the surface could be chilled to a temperature below freezing-point, it would not as a rule become heavier than the water beneath.

But even supposing the sea-water were equally salt at all depths the formation of ice in water that was sinking far below the surface would be greatly hindered by the fact that the temperature of sinking water

risers in consequence of the compression which is brought about by increasing pressure, while its freezing-point sinks simultaneously owing to the same pressure.

I have actually observed the phenomenon of ice forming below the surface of the sea, but it took place in quite another manner. A layer of almost fresh water (river-water or water formed by the melting of drift-ice in summer) was floating on the top of cold Arctic sea water having a temperature under 30.2° or 29.3° . In this case the fresh water will be chilled to its freezing-point where its lower surface comes in contact with the underlying cold water, and will turn into ice which rises to the top in the form of ice-crystals; these will then collect on the surface of the fresh water, where the temperature may be a degree or two above freezing-point.¹

On the following day (*March 29th*) we remained stationary most of the time, for the visibility was poor (with a temperature of -6° C. and light winds from the south and north-west) and the ice was heavy to move on account of the snow and sludge which choked up the openings between the floes.

I went aboard the Scotch sealing-vessel with Krefting and Markussen for another consultation, and received a hospitable welcome.

The moment you get on board a foreign ship you

¹A number of water-samples which I brought home in carefully sealed glass tubes were given to someone else for analysis, but unfortunately the analysis was never made.

notice that there is something different about her. Here, rough as it all was, there was still an air of homely, British comfort, especially about the open fireplace and the faint smell of coal-smoke that prevades the Britisher wherever he goes. The dinner was a good solid British one consisting of roast beef (of course) and a heavy English pudding warranted to keep you going for a long time. Beef is not difficult to provide in the Arctic Ocean; the sealers bring it with them from home, for if they get a supply of fresh-killed meat and hang it up at once in the rigging it will keep fresh for the whole voyage in this pure air devoid of bacteria.

We lay motionless all that night, and on the following day (*March 30th*, obs. $75^{\circ} 23' \text{N.}$, $5^{\circ} 40' \text{E.}$ — 8°C. , light wind from NW) the five other craft that we had seen came quite near. They included the "Albert," with Captain Bernt Iversen, the "Hekla" with Captain Hansen, the "Geysir" with Captain Ole Iversen, the "Haardraade" with Captain Castberg, and the "Kap Nord" with Captain Gullik Jensen, all of them amongst the best sealing captains.

We steamed towards them to get news. We passed the "Hekla", and Captain Hensen came aboard our ship; Guy and Markussen also joined us, and so did a man from Castberg's ship, which lay a mile astern.

Then followed a great council of war in the cabin, and Hansen told us that he had been in this latitude for a considerable time. Iversen of the "Albert" had seen 20 or 30 families of bladdernose seals among some heavy ice up in the north.

But they all agreed that the breeding grounds must be to the west; perhaps it was not very far from where we were, for the bladdernose was always found to the north-east of the breeding-grounds, so the latest theory ran. The only difficulty was that the ice was too compact, and we were afraid of being frozen up.

It was therefore decided that we should first try to get into open water and then proceed towards the north-west, where the sky was very dark, and we might expect to find open water. From there we might perhaps be able to find our way to the seals.

We steamed eastward towards more open water, but finally stuck in the ice and stayed there for the night. The weather was becoming colder; in the day it had been $17\frac{1}{2}^{\circ}$, but the evening temperature was $8\frac{1}{2}^{\circ}$.

Next day (*March 31st*, obs. $75^{\circ} 17'$ N. and obs. $6^{\circ} 30'$ E., W. wind) the "Haardraade" caught us up, but the "Geysir" dropped astern.

Castberg and his son Ludvig, together with Guy, Hansen and Markussen came aboard in the morning. Another consultation was held. Some thought that the other ships might already have found the young seals, while others thought that they had not. They all agreed, however, that it was quite possible that nobody had found the young seals yet, and they still believed that the seals lay to the west, though there might be a group of seals in the north or the north-west; and they were sure that the seals in the west must have been frozen up.¹

¹This proved to be correct.

In the opinion of some it was quite possible that the other ships had worked their way up to the breeding-grounds from the south. Others inclined to the view that we were now in the heart of the great ice-promontory, and therefore not far from the seals, and that there was open water to the north, as indicated by the intense blueness of the sky in that quarter.

The only objection was that the ice here was not as it should be; it was merely new ice without any older hummocks among it.

Everybody wanted the "Viking," which had a more powerful engine than the other ships, to lead the van, so that they might get out of the ice and avoid freezing fast; but Krefting was not so enthusiastic about this plan, objecting that it would use up too much coal, because the ice was too heavy and compact.

Captain Castberg related how he had several times in previous years met with seals in the water coming up from the south towards the breeding-grounds. But he was not sure whether these seals had come down from the north first, and when they got too far south had turned back because the ice was not to their liking. He thought, however, that there was a migration of seals from the south, whither some of them migrate immediately after leaving the breeding-ground, though of course the main body of the seals migrated northward.

Krefting was of the opinion that the seals which migrated to the south also migrated to the north later on in the year. They only paid a short visit to the banks off Iceland, so there would only be *one* migration

of seals to the breeding-ground, and this came exclusively from the north.

As we could not move on at present, I whiled away the time by shooting gulls, and incidentally got a very thorough ducking while I was engaged in picking them up. While jumping across the sludge between two ice-floes I went through in the middle and only managed to regain firm ground on the ice-floe by laying my gun across the sludge. Generally speaking, this sort of ice with sludge packed in the open spaces between is pretty treacherous; we had many an unpremeditated bath, often up to the armpits, but had just to get up ourselves and struggle on.

The weather remained cold, from $10\frac{1}{2}^{\circ}$ to 7° , with a west wind. This did not look promising; the ice would soon freeze into one continuous field.

That afternoon I accompanied the captain on a visit to Castberg, and we sat talking for a long time about the usual topic of seal-hunting.

Castberg propounded the theory that the seal brought forth her young twice a year. He doubted whether 8 per cent of the young seals here were females, for according to him male young ones were brought forth in the autumn.

Krefting, on the contrary, believed that they only had young once a year, because the English sealers frequenting Davis' Straits in the autumn only came across females with small embryos.¹

¹This is fully borne out by my own observations at a later date. In October, 1888, I found many small embryos in female saddleback seals at Good Hope on the west coast of Greenland.

He thought that the period of gestation was approximately one year, and that the rutting-time lasted for a month after the birth of the young. But he suggested that the seals which bear female young might possibly congregate elsewhere. Or the females might take longer in developing and so be brought forth a little later than the males.

Captain Hansen assured us that he had been on breeding grounds where all the young seals were females.

I interposed with the enquiry whether they did not consider that all this seal-hunting year after year was exterminating the seals. But Castberg would not hear of such an idea and became quite excited about it.

"Why, I wonder at your asking such a question. There are so many seals up here in the Arctic Seas that all those that we catch are only a drop in the bucket. I've sat up in the crow's nest and as far as I could see through the telescope seals were lying packed together on the ice in every direction right away to the horizon, and just as far on the other side, too! There were so many seals that it would take years and years to make an end of them, even if they never had any young ones. And just the same with the bladder nose; I've seen such a lot of them lying scattered like coffee-beans over all the ice in sight that you simply couldn't ever stamp them out. No, lad, Providence created the seals for us to catch, and Providence will see to it that they don't grow scarce."

It was the old story; hunters will never admit that the animals they hunt are becoming reduced in number,

whether it be seals and whales in the sea, or wild reindeer on land.

Later in the evening we also paid a visit to the "Vega." While we were on board the ice grew slacker, so we had to row back to the "Viking" in a boat.

V

WHAT HAS BECOME OF THE BREEDING-GROUNDS?

APRIL the 3rd was now drawing unpleasantly near, and there was no longer any hope of finding the breeding-grounds before then; but we had to make a last attempt to extricate ourselves from the ice if we did not want to stay there for the next five or six weeks.

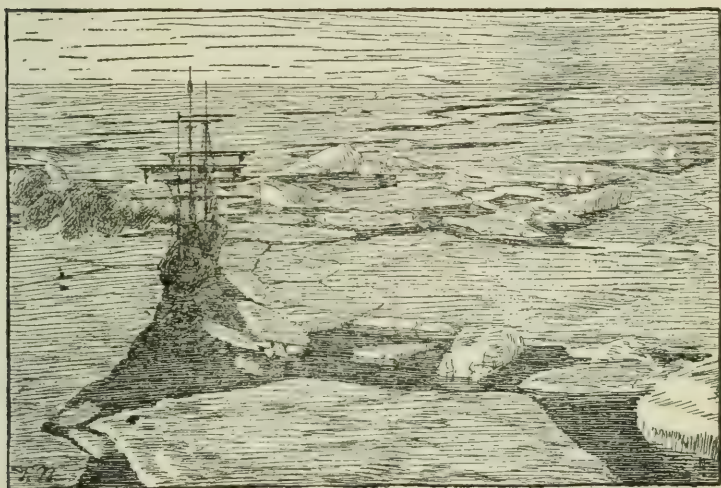
The weather was becoming colder; at night the temperature was 3° and towards morning it went down to zero. If this went on we should be frozen fast. The wind had dropped, too, so Krefting saw that after all we should have to try and force our way out.

On the following day, therefore, (*Saturday, April 1st*), he sent a message to the other vessels, asking them to provide extra hands to help in "rolling" the ship, which means that the sailors all stand together on one side of the deck, then run across to the other side, then back again, at regular intervals, in order to make the ship roll and break the ice around her.

We began to ram the ice in front, but had very little hope of success. The extra hands came aboard, and soon about a hundred men were collected on the "Vik-

ing's" deck, rushing vigorously backwards and forwards in time to the word of command.

At first we succeeded beyond our expectations. We easily passed Castberg's ship, the "Haardraade" which had been vainly endeavoring to force a passage through the ice, and sailed on for a fair distance from one patch of open water to another until we stuck in the ice. Then we would go astern a little, then full speed ahead



A sealing vessel forcing her way through difficult ice.

again, and the "Viking" would ram the ice, run up on to it and crush it underneath her, while the crew hurled themselves with all their weight against the bulwark first on one side and then on the other. The ice could not withstand such an onslaught; it split asunder, and rising on end in front of the bow was forced aside or under the ship, which went gliding on again for a long distance.

Sometimes the propeller would knock against a block of ice with such force that the engine almost stopped and the vessel shivered from stem to stern. A knock like that might easily break the propeller off, but should such a misfortune befall us we had a spare one which could be fastened on instead, though it would mean loss of time.

We went at it with a will, for we were determined to get on, and get on we did, leaving the other vessels farther and farther behind although they had the advantage of following in our wake.

They could not keep up, so the hands they had lent us had to go back to them. At length they disappeared below the horizon. Only one of these vessels could make headway, and that was the "Nova Zembla," which actually sailed past us. She had hit upon an easier way out.

In the evening we got out of the thick ice and into the blue bay-ice; after that we emerged into open water and shaped our course for the south. We lost sight of the "Nova Zembla" in the dark; probably she had turned northward.

There was a full moon and the stars were shining brightly. The moonlight glittered here and there upon the open water, and white floes lay scattered in and out among the blue bay-ice. Over in the north-west the whole sky was tinged with a dark reddish-purple glow, while the horizon elsewhere was yellowish-white from the reflection of the moonlight cast back by the far-distant ice-fields. What would one not give to be able

to fix a night like that upon paper and so perpetuate it!

The captain was standing on the half-deck aft and looking back at the ice we had left behind.

"The young seals are over there in the west, and yet we are sailing away from them," he said sorrowfully.

He had an instinctive feeling that the breeding-grounds were somewhere in there among the compact ice, but what should he do to reach them? It would be folly to remain where we were, when we ran the risk of being caught in the ice.

A better plan would be to remain as long as possible in the open along the edge of the ice, and wait until a favorable opportunity occurred for sailing into the right part of the ice-field.

This seal-hunting is a gamble if ever anything was. If you find the young seals you may count upon paying for the voyage even if the catch is only a medium one, while a full cargo means wealth for the owner and the captain, and good earnings for the crew.

Many a ship-owner who was hard up or on the verge of bankruptcy when the ship sailed, has found himself a wealthy man on the day she returned to port from the breeding-grounds with a full cargo. But if she had missed the young seals the vessel would be practically empty, especially in the old days before bladder-nose-hunting in Denmark Strait had begun, and that spelled ruin for the owner, a heavy loss for the captain, and such miserable earnings for the sailors and their families at home that they might be hard put to it to tide over the winter. No wonder, then, that success

in finding the breeding-grounds means everything to the sailors themselves. Even at the best their earnings are not much to boast of.

The whole system of paying the crews of these sealing vessels may seem a trifle complicated to the uninitiated. One-sixth of the value of the total catch is allotted to the crew. This sixth part is theoretically divided into one whole share per man, and these whole parts are subdivided into sixteenths, which are paid out to the sailors in addition to their fixed monthly wages.

In those days an ordinary seaman's pay on board the sealing vessels amounted to 20 kroner, or about 5 dollars, a month, and a five-sixteenths share. Boys only received one or two sixteenths. The seal gunners of whom there were usually nine on each vessel (the "Viking" carried ten) received from ten to twelve sixteenths, the first mate sixteen sixteenths (or a whole share), and the captain received 96-sixteenths (or six whole shares) of the portion of the catch allotted to the crew, and an equal amount from the owners. In this way the captain received twelve whole man's shares besides his fixed pay.

By adding together all the sixteenth parts assigned to the crew and captain we get the total number of sixteenth-parts, and by dividing the value of the crew's share of the catch by that figure we arrive at the value of a sixteenth part.

If this amounted to about twenty kroner, as it probably would in an average year, and if the ship was at sea for five months, a seaman could earn 200 kroner

in all on the whole voyage, i.e. 40 kroner or about 10 dollars a month.

Certainly this was not very much if the man had a wife and children waiting for him at home. Supposing the ship secured a full cargo the sixteenth part might be worth somewhat more, but in any case it was never much money, and in seasons when the ship had bad luck it came to far less; and yet these men would go back year after year to the Arctic Ocean.

At night we changed our course again and headed northward for some open water which, judging from the dark sky which we had noticed in that direction the day before, we believed to stretch inward across the ice in that quarter.

Next morning (*Sunday, April 2nd*), we sighted the "Haardraade," "Hekla," and "Vega" again; they had got on a good way towards the edge of the ice, but had now stuck fast and were unable to go any farther. We also saw the "Nova Zembla" again; she had been up north but had evidently found nothing and was now shaping a course for the south-west. We followed her example, as the ice to the north looked too heavy.

The weather had become slightly warmer, 16° to 14° where we were now, outside the compact ice, and a somewhat stronger west wind was blowing.

We passed through blue bay-ice and open stretches of water most of that day, and kept on in a westerly direction as far as possible.

This tough blue bay-ice is almost the heaviest kind to sail in, even if it is no thicker than six or eight inches.

It is remarkable how quickly this ice will form, covering some hundreds of miles in the course of twenty-four hours. When we entered the ice there was not a sign of blue bay-ice, and during the past few days it had been snowing so fast that we could scarcely keep the deck clear, yet from where we were now we could see blue bay-ice, without any snow on it, as far as the eye could reach. Probably the snow falling into the water helped it to congeal so quickly.

With all its white-edged "plates" frozen together this ice looks like a tiled floor.

In the afternoon we got into heavy ice again, and became immovably jammed in it. It was curious to see how the ice floes rose edgeways on either side of the ship and pressed against her until she creaked in all her joints.

But an hour later the floes slid apart and left a passage open for us. Life in the Arctic Ocean is full of ups and downs. At one time you are locked in the ice, at another you are out again; now you are in open water, now in ice; now you are full of hope, now you think that all is lost; and on this particular evening the prospects seemed pretty black. Not a seal was to be seen anywhere.

On the stroke of twelve the slaughter would begin—for those who had reached the breeding grounds; and they would have perfect weather, with brilliant moonlight. But there were eighteen degrees of frost, so all the ice-field would soon be firmly frozen.

Monday, April 3rd, (obs. $74^{\circ} 6' N.$ Lat., obs. $9^{\circ} 30' E.$ Long, 16° , clear, light wind from WSW). The

time for catching the young seals had arrived. We wondered whether any of the ships had got to the breeding grounds, and our spirits were not very high on board the "Viking."

All that day we steamed on through bights and patches of open water with blue bay-ice in them, hoping that we might find a way across to the south-west. Beautiful sunny weather favored us all the morning.

In the afternoon we stuck fast in the ice again. The gunners amused themselves by shooting at a target for practice. When we got free again we passed on into the ice-field, but we could not see any seals.

In the evening we had a wet wind and fog (19°), and the rigging became completely covered with rime. It was curious to observe the appearance of the fog that hung over the surface of the open channels; above the dark water it looked black, rather like the smoke of a steamer, whereas the fog around was quite light in color owing to the reflection from the white ice below.

The crew had gone on hoping that they would still reach the breeding grounds, but now they gave up; they comforted themselves, however, with the thought that they would make up for it when they started hunting the bladdernose seals. It meant a great deal to them, for their share of the catch ought to represent more than half of their earnings.

On *April 4th* we had fog all day and a south-west wind (23° at midday). We moved on a bit, but got jammed again in the afternoon and remained stationary all night.

Next day (*Wednesday, April 5th, 27°*), I received word that there was a peculiar looking bird on the ice a short distance away from the ship. I went and shot it, whereupon I discovered that it was a gyrfalcon (*Falco gyrfalco*) which had lost its way out here on the ice-fields, far away from any land. Probably it was living on sea-birds. Our position at the time was $74^{\circ} 8' \text{ N. Lat. and } 10^{\circ} 30' \text{ E. Long.}$ It seemed to be a young bird, as it was rather dark in color instead of being of a white shade as the Iceland gyrfalcon usually is, especially in Iceland and Greenland.

The ice is very variable. All that day it was pressed up to such an extent that for long distances it lay many layers thick and stuck up edgeways along the sides of the ship, which was lifted rather high. Then in a short half hour we found ourselves in open water. It seemed as though the ice will often close and open again twice in the twenty-four hours with the turn of the tide.

April 6th was Maundy-Thursday (32°). I went gull-shooting with one of the sailors in the morning, and had a long outing. At the end of it we were just going to cross a lane of open water on an ice-floe, but our crossing became longer than expected; for I fell into the water and lost my seal-club; this left us with only one seal-club for a paddle, and the floe was only just large enough to bear us. We stood in water up to the ankles and made but slow progress, but in the end we managed to reach the "land" after all.

On approaching the ship we fell in with two figures in fancy dress promenading on the ice. They were

two seamen from Holmestrand with jerseys on their legs by way of knee-breeches, false corporations, tail-coats, top-hats, and white moustaches. They had been having a lively time on board in our absence, with a "horse-fair" and many other attractions.

In the evening the captain and I paid a visit to the men's quarters, where they were having great fun. "Hand-slapping" went on merrily all the evening, accompanied by various practical jokes. In this game you bend down with your hands on your back and your head on the lap of someone who covers your eyes. The rest come and hit the palms of your hands in turn, and you have to guess who did it. If you guess correctly, the man that hit you must take your place. You are only meant to hit with the hand, but they often hit with shoes, slippers, clogs, and an ancient galosh; and they were not particular about hitting gently, either. But it was all done very good-humoredly amid roars of laughter.

The evenings were beginning to lengthen more and more, and it grew light remarkably soon; before long the night would be as light as a summer night at home. There was a reddish glow on the horizon to the north as the sun moved on; and the reflection from the snow helped to make it lighter.

On Good Friday we remained stationary (32° to 25° , wind from the SW). Easter-eve (*April 8th*) was not a holy-day, and one noticed the difference by the increased activity on board, though there was not any too much to do and everybody was longing to find

the seals. The crew would be all the better for having some real work now.

The barometer, which was low enough in the morning (29.35 in. at 8 a.m.) fell rapidly as the day advanced, and the temperature rose from 23° at 8 a.m. to 34° at midday, and 32° at 8 in the evening.

In the morning a stiff gale had begun to blow from the south-west. It increased during the day and veered towards the west until it was blowing a hurricane from west-south-west at seven o'clock. It whistled and howled in the rigging, and the whole ship shuddered, but it could not do us any harm when we lay so snugly in the ice.

The water whirled up like a cloud of dust from the stretches of open water, which were becoming constantly larger and more numerous, much to our satisfaction, as we were quite ready to leave this ice in which we had been jammed for four days.

The whole pack of ice was drifting eastward, and at no mean speed either, judging from the water around us, which was swirling as it does in the wake of a ship.

At nine o'clock in the evening the glass began to rise again after being as low as 29.00 in.; the gale was veering round to west-north-west and gradually decreasing in force, while the temperature fell again until it was down to 21° . There was scarcely any swell in the ice, so we were evidently far away from the open water in the west even if such existed.

The continuous westerly winds which had been blowing for ten days (since March 30th) had driven the



Captain Krefting and the crew of the "Viking."

ice eastward at a great pace; I noticed this whenever I was trying my tow-nets for catching animals or taking the water-temperature below the surface, for the line attached to the nets or the instruments was invariably deflected strongly to the west.

A storm of this severity is a rare occurrence in the ice-field, as the winds, especially the southerly winds, blow with considerably less force there. The captain told me that he had often seen becalmed vessels drifting along the edge of the ice whilst others which were merely two or three cable-lengths farther out were sailing before a good breeze.

The most probable explanation would seem to be that the air above the ice-fields is cold and heavy, and hangs there like a protective shield, while the southerly winds bring with them a current of warmer, lighter air which is compelled to rise above the cold, heavy layer, without touching the surface of the ice. This was the hypothesis I considered most probable at that time, and its correctness has been proved by many subsequent observations; it is an ordinary phenomenon of wide application in meteorology.

In honor of Easter-eve extra rations were served out to the crew: as much hasty pudding as they could eat, as much beer as they could drink, and a glass of grog into the bargain.

When this news spread along the deck the crew gave three cheers, and afterwards the cook came in state to the saloon to thank the captain on behalf of all the hands.

Later on we went forward to see how the men were

getting on, and found them in a very jovial mood; they were all rather "mellow." Hand-slapping was in full swing and still aroused unabated enthusiasm. Occasionally somebody obliged with a song, and there had been speeches earlier in the evening before we arrived on the scene. Everyone looked thoroughly happy, and all disappointment at not having found the young seals was for the time being forgotten. It does not take much to put these childlike souls in a good humor.

The weather on deck was more pleasant; the storm had abated a great deal, and the evening was clear and light. One's thoughts wandered away from these boundless ice-fields to the spring evenings in Norway.

But the wind was chilly, and we were glad to return to the warm cabin. Here we enjoyed the luxury of a pipe as we sat one at each end of the sofa with our feet on the table, and chatted about life at home and the spring shooting.

The wood-cock would now be flying over the fir-trees fringing the marshes. How peaceful and lovely those evenings were in spring, and how far removed from all this toiling and moiling to find the young seals—if we ever did find them—which made life out here such a nightmare.

Then the steward appeared with bottles and glasses and hot water; we had to show that we were also good Christians by having a glass of grog in honor of the festival.

We made our brew, filled another pipe, and the cap-

tain went on telling me about all his experiences on land and sea, and about the life in the Arctic Ocean.

He had evidently been a wild scapegrace when he first entered upon this life as quite a young lad; but he quickly rose to be gunner and mate, and was looked upon as one of the best among the younger men; certainly he was a daring, reckless fellow.

Then the sealing vessel "Magdalena" needed a new captain. Young Krefting applied for the post, although he was not much over twenty and people thought it rather cheeky of him. He went to see the owner at Tönsberg and recommended himself for the job. The owner objected that he was too young; to which Krefting replied that if that was all it was a fault which time would put right.

In the end the owner appointed him skipper of the "Magdalena," and he had no reason to repent of his choice. Time after time the young dare-devil brought her home with a full cargo, and year after year the owner rose in the world.

But he was certainly reckless in navigating and in forcing his way through the ice, and his ship had to put up with a good deal of rough treatment.

For instance there was the year when she sprang such a dangerous leak. Krefting had forced his way into the ice in a heavy swell and damaged the vessel badly; but he had a good catch and loaded her as full as she could carry. When he got out into the sea again the ship made water so rapidly that it was all they could do to keep her afloat.

After a time the crew tired of working the pumps in-

cessantly night and day and when on the way home they were off Iceland and sighted another sealer in the vicinity they determined to take to the boats.

A deputation consisting of the boatswain and several gunners came aft to the captain's cabin to inform him that the crew, having discussed the situation and unanimously agreed that it would be unsafe to stay any longer on board this leaky ship, which could not possibly be kept afloat, had decided to abandon her.

The captain went on deck. He found the crew assembled near the bulwark, some of them already in the boats, which they were preparing to lower. A carpenter's axe happened to be lying on the deck. The captain remarked: "You are going to abandon the ship, are you? All right, lads, I'll help you to lower away;" and picking up the axe he strode across to the boats to cut the falls. At that the sailor-men climbed out of the boats very much quicker than they had climbed in.

Next he made a speech to them and told them they had no more sense than children. Here they were with a big and valuable cargo, and yet they wanted to leave it just because they could not put up with a few days' hard work at the pumps. But this couldn't last for ever, as the fox said while they were skinning him, and after that they would get a bigger share than they had ever earned before. Whereas if they left the ship now, what would become of the share? It would be a jolly sight smaller, he could tell them; and what would they say when they went home?

The crew stayed on board and went on pumping,

and the "Magdalena" got home all right. When they sailed into Tönsberg harbor Krefting ran her into the shallow water as far as she would float; there he dropped anchor, and there, too, she sank as soon as they stopped pumping. But she was safely berthed, and none were better pleased than the crew, who pocketed a big share of the profits, and the owner, who made his fortune.

The worst of the "Magdalena" was that her bow was not well shaped for going through the ice; it was too vertical, so that she could not run up on to the floes, while it strained the ship too much when she charged them. But one had to push on somehow if one wanted to get to the seals.

Off Greenland, in Denmark Strait where the bladder-nose seals congregated, the heavy ice was particularly difficult to traverse. It was more rugged and dangerous than the ice to which the sealers had previously been accustomed in the sea around Jan Mayen, and the other skippers were cautious and disinclined to take risks there.

But Krefting had forced ahead and got through, and caught his seals too; though the ship was usually leaking like a sieve every year when he brought her home. The owner used to grumble a bit at the big bills for repairs; but he was making money, and would not have parted with his dare-devil captain for anything. Every winter the "Magdalena" had been overhauled and strengthened, and now, Krefting thought, she was one of the strongest craft sailing in Arctic waters.

Wherever he went on sea or land Krefting was the same devil-may-care fellow, and not least so in his language. He had a poodle to which he was much devoted. One day in Christiania he was walking past the post-office in Karl Johan Street when he met a burly fellow, a singer named K——, who went about with a Great Dane which he had once set on the poodle.

Krefting stopped in front of him and said:

“Look here, if you set your ugly brute of a mongrel on my dog again, I’ll smear your dirty head all over the post-office wall!”

Well, well, life was a battle, not only in the Arctic Ocean, but at home as well. And the skipper declaimed his favorite poem by Braun, about disappointed love and the sadness of life. . . .

We drank each other’s health, and he sang:

In drinking till the daylight ends
No sense at all I find,
But round the festive bowl with friends
I sometimes change my mind.

In this way we sat on talking till late in the night, and then we turned in.

On the morning of Easter-day (*April 9th; 74° 2' N. by obs., 13° 30' E. by obs.*) a stiff gale from the north-west was still blowing, but the sun shone brightly and there were twenty-three degrees of frost.

The wind felt bitterly cold; indeed, we seldom experienced a lower temperature throughout the voyage, the lowest being 32° on the night before April 1st. The cold was strangely penetrating in the Arctic

Ocean, probably because the air was so raw and there was always a wind on deck. It went right through your body if you were only dressed as you would be on shore, and made you feel very much as though you were walking about naked.

Krefting was right. If he saw me going about thinly clad on the deck he would say: "Don't show off and get yourself frozen blue for your pains. Those landlubber tricks won't do here in the Arctic Ocean."

Once when he was at home in Norway somebody asked him how cold it was as a rule in the Arctic Ocean. When he replied that there would be some twenty or twenty-five degrees of frost the landlubber didn't think that that was much to boast of; why, they often had twice as many degrees of frost in Christiania.

"Ay, with the degrees you have on shore," Krefting retorted, "but what you should remember is that the degrees in the Arctic Ocean are four times as big!"

The ice having slackened, we were at last able to set sail. The crew worked with a will. First came the lower sails; the main-sail and fore-sail; the staysails were hoisted in double quick time; the spanker was set. Then came the hoisting of the patent-reefed top-sails, and thirty men in line along the big topsail-halyard tramped aft over the deck in time to the cheerful melody of:

"And who could lead the dance so well

As pretty Mistress Hansen?

Tra-la-la-la, tra-la-la-la, tra-la-la-la, ahoy!"

The gale had abated a little as the morning advanced, and we could hoist more sail; so some of the hands

were sent up aloft to cast loose the topgallant-sails, while others hauled at the sheets and braces.

Everybody worked away in the best of spirits, and very soon the ship was under canvas and sailing out of the ice.

But then arose the eternal question: in which direction should we go, south-west or north-east?

To start with, at any rate, we would make for the south, but in an hour's time we might very likely decide on something else.

Today we could at last take observations of latitude and longitude. For several days it had been too cloudy to take any, but as we had remained stationary nearly all that time, we did not think we could have moved far to the east. The captain, however, was inclined to suppose that we were in 10° or 11° East, maintaining that we had drifted considerably with the ice. Great was the consternation when the longitude had been worked out and proved to be $13\frac{1}{2}^{\circ}$ E. The ice must have drifted at a tremendous rate. It was an unheard of thing to find ice in these longitudes; why, it was right in the middle of the Gulf Stream. We were now in $74^{\circ} 2' N.$, and not more than 90 miles or so from Bear Island (Cherrie Island).

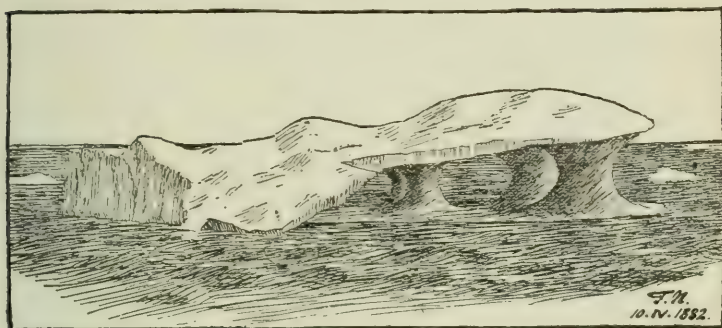
The water was quite warm, viz. 34.7° on the surface, a remarkably high temperature with such a quantity of ice about. In some places there were large continuous stretches of ice, in others detached strips of it with open water between.

One could see from the appearance of the ice that the water was warm, for the edges were rounded off,

and the floes had holes as though they were being melted by the warm water underneath them.

When we got into heavier hummock-ice in the afternoon the surface water was naturally somewhat colder, but even then the temperature kept at about 2° of warmth.

We saw a young bladdernose seal lying up on this hummock-ice; it was the only sign of living creatures we saw in the neighborhood.



A hummock of sea ice, hollowed out by the warm sea.

By and by we sighted two vessels with their sails furled lying on the ice, several miles from its edge. This seemed strange. What could ships with furled sails be doing in there, unless they were catching seals?

At any rate we might as well have a talk with them; so we changed our course in order to enter the ice. For the first time we now encountered fairly large pack-ice, which is the true sealing ice (i.e. ice that the seals may be expected to lie upon).

The action of the warm water had given very fantastic shapes to the blocks of ice. There were dark ultramarine blue caves with pillars and stalactites

hanging down from the roof; mushrooms with slender stalks and big tops to them, floes perforated all over by a number of round holes, and so on.

The ice became firmer and heavier the farther we penetrated it. After breaking through the pack-ice we emerged into tough bay-ice, which for the most part was even more difficult to navigate.

The temperature of the water had fallen to 29.5° now that we were surrounded by ice.

We thought the two vessels were the "Magdalena" and the "Jason"; they lay stern on, so they were difficult to recognize, but our surmise proved to be correct. The eye of the Arctic seafarer is accustomed to distinguish between the various craft, and a glimpse at her rig is usually sufficient; he recognizes one by the proximity of the funnel to the main mast, another because the funnel stands midway between the masts, because the funnel is black, or because it is yellow. He identifies her now by the peaked yard-arm, now by the double top-sail-yards, now by the high bow, now because her stern is rather high, and so forth.

A little past midnight we arrived near the ships, and lay to for the rest of the night.

There were large channels here, and the water was consequently warmer, being about 32° on the surface.

The weather was fine and clear, and it was so light that I could easily distinguish the hulls and the rigging, even to the cordage, of the two vessels, although they were some distance off. The stars were gradually fading away and not many remained visible. A beautiful reddish glow was overspreading the northern sky.

Next morning (*April 10th*, $73^{\circ} 14'$ N. and $13^{\circ} 24'$ E. by reck.; 19° , wind from the NW.) Captain Stökken of the "Magdalena" and Captain Jacobsen of the "Jason" came aboard us. They had been ice-bound since the end of March. Yesterday the ice had begun to loosen for the first time. The "Harald Haarfager" commanded by Captain Grönvold was probably lying ice-bound twelve miles farther north, where they had left her before they themselves got caught in the ice. Probably the "Isbjörn" was up there too. This looked more hopeful. We could now account for no fewer than twelve ships which could not be engaged in seal-catching.

Stökken had a notion that the breeding-ground lay to the south-east; this was quite a new theory, but there might be something in it as there was good sealing ice where we were, and both Stökken and Jacobsen thought they had seen smoke from a steamer in that direction on April 3rd.

They had encountered the English sealer "Polynia" near 0° Longitude at the end of March, and had then proceeded northward right up to 74° N.; they had sighted seals and bears going north and north-east, but Stökken had no faith in these signs, for he had so often found them deceptive.¹

The Englishman had been convinced that the breeding-ground was situated in 72° N. and 0° Long., they themselves had met with what they termed the real

¹Judging from what we learned later the seals they saw were actually going towards the breeding-ground, which would be somewhere to the north of them.

Polar-ice, which consisted of huge floes of blue ice reaching as high above the water as the table in the cabin, and with sharp edges that had never known what it was like to be in a swell.

They all agreed that this was the most remarkable year for ice that they ever had experienced. But Svend Foyn had said that he once found the breeding-grounds nearer to Norway than to any other coast.¹

Jacobsen told us that during the gale on the 20th and 21st he had steered the "Jason" away from the ice, as he did not dare to go into it. He called it the worst storm he had ever seen. An ice-floe on the top of a high sea had been hurled against the side of his ship and had smashed four planks above the ice-sheathing.

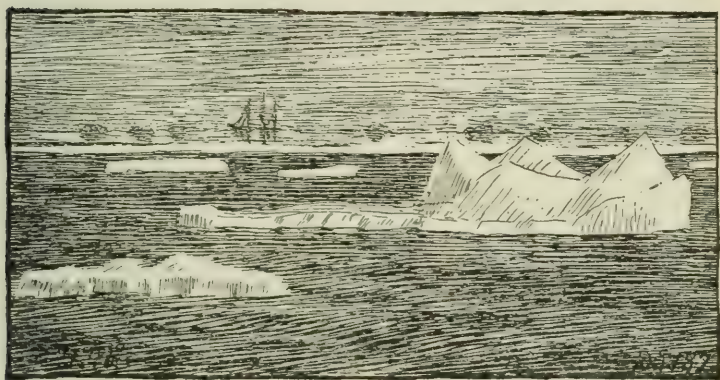
Strange to say, none of the others had noticed this storm as much as the "Jason" and ourselves. Probably they were farther in among the ice. On the other hand they were full of a storm which they had been in on March 12th.

While we still lay quiet in the morning I tried to take the temperature of the sea with a deep-water thermometer, but the eastward drift was so pronounced that it proved to be impossible. Although I used quite a heavy lead the line was carried along sideways in the water and I failed to reach farther down than about 20 or 25 fathoms, where the temperature was 35.4°.

¹This would be in 1858 when the breeding-grounds were situated in about 71° 20' N., 7° 41' E. (April 3rd) and drifted southward to 70° 41' (April 9th), and when Svend Foyn in the bark "Elieser" caught 16,400 seals in five days.

The surface of the water had also a temperature of 35.4° . We must be drifting very rapidly eastward.

Sailing abreast, the three ships now steered south-east in order to get out of the ice, and the farther we progressed the more broken up the ice became. It lay in broad or narrow strips, with numerous large blocks floating around them. I saw one hummock which I estimated as being about 20 to 24 feet above



A mirage seen on April 10th, 1882.

the sea. The separate drifting floes and hummocks, in particular, had assumed the most extraordinary shapes, which offered excellent subjects for the sketch-book.

This morning there was a very noticeable mirage, which was no doubt due to the difference in temperature between the air and the surface of the water in that region. We saw the ice blocks near the horizon floating in the sky. The "Jason" looked as if she were sailing on a clear sea, with her reflection in the water underneath her. Needless to say, I tried to draw

these curious effects, but the will is often better than the deed.

The mirage continued throughout the day. It was cloudy weather, and the horizon showed dark in every direction.

This mirage seemed to be similar in kind to those which are often observed in the desert; it was due to the warming of the air by the surface of the water, so that a thin layer just above the sea was warmer than the rest of the air higher up.

The temperature of the air on the day in question was between 19.2° and 22° , while the temperature of the water on the surface was 35.4° at 9 a.m., 40.1° at 6 p.m., and 35.6° at 8 p.m. A moderate wind was blowing from the north-west.

The higher objects, such as tall ice-hummocks and the rigging of a ship, rose above the thin layer of warm air into the colder air, and could thus be seen directly from the half-deck of the "Viking" without any refraction of the rays of light. The light-rays from the lower objects, on the other hand, such as the surface of the sea near the horizon and the flat floes, first passed through the warm layer of air and then obliquely up through the colder layers, with the result that they were refracted upwards before reaching the eye of the observer on the deck of the "Viking." In this way the horizon was lowered and it looked as though there was air or shining water between the horizon and the higher hummocks or the rigging of the ships. At the same time one could see a sort of reflection of these higher objects in the fictitious shining water,

caused by rays from them which first went obliquely down towards the warmer layer of air and then, where the warm and cold layers met, were reflected to the eye of the observer, who would thus see an inverted image.

About midday we began to see some bladdernoses up on the ice, and the first seal was shot at last. It was a young bladdernose, and very pretty it looked, too, as it lay there on the snow, fat and sleek in its greyish-white coat, not yet soiled with blood.

A boat was lowered. Everybody bore a hand and wanted to do his bit, and the little Danish seaman who went in the boat gave vent to a loud hurra! of exultation as he jumped out on to the floe and seized the hind flippers of the seal, which was the first dead one he had ever seen.

The whole animal was taken on board, and with due pomp and circumstance exhibited to all the land-lubbers i.e. the benighted individuals, such as myself, who had never been in the Arctic Ocean before. They had to be shown how to skin it, an accomplishment which it would of course be indispensable for everybody to possess when we reached the breeding-ground; so we set to work in earnest.

One or two tried their hands at it, and naturally made every blunder it was possible to make.

To skin a seal as the sealers do it is in reality quite easy and can be done in a few minutes. The layer of blubber is under the skin and comes away with it, so all you have to do is to cut along between the blubber and the flesh; and as the seal is more or less the shape of a big sausage, this work is quickly performed. The

animal is first laid on its back, after which the skin and blubber together are split open by a long cut from chin to tail. Next the skin is loosened up near the head by several cuts round the neck, and several long slashes are made with the knife between the blubber and the flesh along both sides of the animal. Then you proceed to cut down between the ribs and the shoulder-blades on each side, in such a way that the latter, together with the flippers, come away with the skin. Finally you cut the skin loose by several quick incisions round the hind flippers and one or two last cuts strip the whole skin with the blubber off the back of the carcass, which is thrown away.

After this you make a hole with the knife in the flesh on one shoulder-blade so as to have something to grip; then you lift up the shoulder-blade, turn the skin inside out over the outer part of the flipper, and sever it with a few cuts; the flipper falls through the hole and you throw it away. The other shoulder-blade and flipper is treated in the same way; after which the skinning is finished, and the skin can be put in the boat and taken on board.

Before long we had caught several bladdernoses, including four young ones, two males with hoods, and a female with milk in her mammæ. The young ones still had navel-strings and could not be more than 8 days old.

I measured two of them, which were 43 and 44 inches (1.10 and 1.12 m.) long respectively. One of the males was 7 ft. (2.14 m.) in length.

The blood temperature was 98.2° (36.8° C.), not checked,¹ and was thus practically the same as in man. On a later occasion I took the temperature of a newly-shot male bladdernose and found that it was 99.3° (37.39° C.), not checked, which is rather higher.

We reached the edge of the ice that evening and shaped our course in a south-westerly direction along it, as we did not consider that there was anything to be gained now by going north-east.

On *April 11th* (obs. $72^{\circ} 14' N.$, $9^{\circ} 45' E.$, 23° , wind NNW) we continued along the edge of the ice towards the south-west, and several times tried to enter the ice, but it was quite impossible.

At length we came to the conclusion that we had sailed so far to the south-west that we could not expect to find anything there either, and the edge of the ice seemed to continue in the same direction.

The captain began to be very doubtful whether it was worth while to stay any longer in this region using up coal in the vain search for the young seals; he felt sure that they had been "harvested" long ago.

But it would hardly do to sail away to hunt the bladdernose seals off Greenland without having discovered whether the young seals had been caught.

He decided that he would cruise back eastward after all, but under sail, in order to save the coal as far as possible.

This question of coal is apt to be a constant source

¹The thermometer had unfortunately not been tested; but it had been obtained from the Zootomic Institute of Christiania University and was considered a good one.

of anxiety. Only a certain amount can be taken on board, and this has to last for the whole voyage. It must not be used unnecessarily, for it must be saved up in order that there may be enough when the sealing begins; but still it ought to be used when there is really something to be gained by hastening on.

In the evening we caught a male bladdernose. It was 94 inches (2.39 m.) from the muzzle to the tip of the tail—a fine big animal. I found the bones of some large fish in its stomach. I could not identify the fish, but at any rate this was a sure sign that there were fish in the sea here.

For several days we went on cruising eastward and northward along the edge of the ice, with a north-west or north wind.

On *April 12th* (obs. $71^{\circ} 28' N.$, obs. $10^{\circ} 0' E.$; 23° in the air, 31.8° in the water, wind NW) we saw the "Magdalena" steering south-west away from the ice. Stökken had had enough of this game of blind man's buff in quest of the young seals, and was hurrying off to the bladdernose seals. Krefting was in half a mind to follow his example, but decided to keep on after all. We had got far to the south, being now in $71^{\circ} 28' N.$ Lat., and as it did not seem likely that we should find anything there we turned northward again.

I could see from the temperature of the water that we were near the Gulf Stream once more. At 2 p.m. on *April 13th* (obs. $72^{\circ} 11' N.$, $9^{\circ} 19' E.$; 21° , strong wind from NNW) I found that the surface temperature was 36.3° , and at 6 p.m. on the same day it was 37.4° .

One could also see that it was warm from the look of the ice; the floes were so round and corroded at the edges.

We saw several large ice-hummocks, including one which the captain and I estimated to be about 30 feet in height above the surface of the water.¹ It was square and of a bluish-white color. This must have been larger than any I had hitherto seen.

We sighted several ships, among them the "Jason" and probably the "Harald." The captain was more and more puzzled as to what he ought to do. Should he waste still more time looking for these wretched young seals, or should he steer westward to Denmark Strait for the bladdernose sealing?

On *April 14th* (16°, strong wind from NNE and NNW) we saw three vessels in the margin of the ice to windward in the north-east. We reckoned that we were approximately in 73° N. Lat. and 11° E. Long. We made several tacks to get near them, and sighted one or two more ships. First we met the "Harald Haarfager," and Captain Grönvold came aboard. He brought the splendid news that not a single ship had found the breeding-ground, unless possibly the "Capella" had; for she was the only vessel that had not been accounted for. He had seen the "Haardraade" and

¹The estimated height may be a little too great, perhaps five to eight feet too much, if it was a hummock of sea-ice. Blocks of glacier-ice may of course be higher than this, but there would be little likelihood of encountering ice that had broken away from a glacier in the region in question. Such glacial-ice from Spitzbergen or Franz Josef's Land would hardly find its way thither. It is equally strange that the hummock is described as square, as the big hummocks piled together in the drifting ice usually have very irregular shapes; but when they capsize, they may appear more compact and regular in shape underneath.

the "Nova Zembla," etc., etc., up in the north, and the others were here in the south.

Then we fell in with the English ship "Jan Mayen" which was leaking like a sieve; they had to keep on pumping day and night, and the water from the pumps had frozen on the deck and hung in long icicles from her sides. She looked a pitiable sight.

The captain came aboard, as did also Captain Deuchars of the German sealer "Jan Mayen," which had come alongside. He was Scotch and an old friend of Krefting; they had met a good many times out here in the Arctic Ocean.

A consultation was held in the cabin. All the Englishmen (or rather Scotsmen) had been accounted for. It was longest since the "Polynia" had been seen; that had been on March 31st, but she was probably caught in the ice, for her captain had wanted to make his way in to 72° N. and 2° W. when the "Jason's" Captain was last in his company. We knew where most of the Norwegian boats were, too. The only one we were in doubt about was the "Capella," as already stated.

This was good news. Now we could recommence our hunt for the breeding-ground from the beginning. It must be situated far in among the ice, at any rate, for we had sailed north and south along the whole outer edge of the ice-field without seeing a trace of it. There was nothing for it but to force our way through to wherever it was. We had better steer for the north again, and see what luck awaited us there.

VI

THE RIDDLE SOLVED

BY the *15th of April* ($73^{\circ} 5' \text{ N.}$, 12° E. , 21° , wind NNO) we were so far north that we could make an attempt to penetrate westward into the ice-field. We killed a bladdernose, and also our first "he-seal"—as the sealers call the adult saddleback. The large herds of old seals which are hunted when the slaughter of the young seals is over are chiefly composed of adult males.

We could now see companies of seals in the water. In the evening the ice became more compact, and a great deal of new bay-ice between the floes made it difficult to move them. It was freezing rapidly, and at length we could not make any headway.

The weather was clear with a beautiful sunset. This is the kind of weather in which it is easiest to see the seals. Just after the sun dips beneath the rim of the ice, and while the sky in the north-west is aflame with red and gold, the air is at its clearest and the horizon most distinct; the telescope is then busily employed up in the crow's nest searching the ice for ships, or smoke, or best of all, the seals themselves.

But this evening we could discover nothing, and we stayed where we were for the night.

Next morning, *April 16th* ($72^{\circ} 45' \text{ N.}$, and 10° E. , 21° , wind NNW) I went for a stroll on the ice and shot some gulls, mostly ivory gulls, including one young bird with beautiful black-speckled plumage.

A piece of drift-wood was found on the ice. It was obviously some sort of pinewood, and at first I thought it must have drifted here with the Gulf Stream from America. But on second thoughts I came to the conclusion that it had been borne along with the ice from Siberia, like so much of the drift-wood.

It was the drift of all this wood that, more than anything else, perhaps, led me to the firm conviction that there was a constant set of the ice across the Polar Sea from the sea north of Siberia, continuing here in the East Greenland Polar Current; and I became further convinced that advantage could be taken of this drift of the ice in order to cross that unexplored sea.

With northerly and north-westerly winds we were drifting somewhat to the southward; according to an altitude obtained at noon we were in $72^{\circ} 45' \text{ N.}$

Later on in the day we emerged from the ice and steered a north-eastward course through slack ice, intending to make an attempt farther north to re-enter the ice-field and work our way towards the west. We tried again and again, but without success; the ice was too firm.

In the evening there was again a clear sunset, but not a seal to be seen.

The nights were quite light now. The sun went down after 9 p.m., and whilst it moved round to the north below the rim of the ice, the whole northern sky was resplendent with changing hues—now pallid from the reflection of the ice, now darker above the open water—now flushed by the red afterglow, now more golden where the red became blended with the light from the snow. One or two purple clouds edged with gold floated low down upon the sky. And higher up a pale green tint melted into the faint blue of the vault of heaven.

All around us the white ice-floes drifted across the dark shining face of the water. Those nearest at hand presented differences of form and colors shading off into green below the water, or into blue at the edges and inside the fissures, with here and there a rich ultramarine tone in the deep caves that the sea had hollowed out in the base of the hummocks.

These colors looked so unreal, so delicate, so pure.

And as far as eye could reach stretched a limitless white plain of drifting ice, bounded by a dark and limitless ocean.

One lonely ivory-gull sailed across the vast, pale vault with effortless flight, and a glaucous gull hovered in the far distance uttering its long, melancholy flute-note. Presently the big black head of a seal rose noiselessly above the shining surface of the sea, gazed with wide-open eyes at the ship, lifted up its nose, and sank down again as noiselessly as before.

This was indeed the realm of infinite solitude. Here

every work of man vanished like the wake of his ship in the ice-field.

On *Monday morning, April 17th* (in $73^{\circ} 25' N.$, $11^{\circ} 20' E.$, 21° , wind NNW), a herd of old saddlebacks on the ice was reported, and at once all was life and bustle on board.

Everybody was keen to get ready for the "fall", as the men term it when they are sent to catch the seals. Skinning-knives were sharpened, rifles overhauled and cleaned, ammunition provided.



Migrating Saddlebacks.

But on this occasion we did not go beyond the stage of preparation.

This was the first herd of seals I had seen on the ice. They lay so close together that they looked like one solid mass, and you might almost have thought it was land. On approaching nearer, however, we could distinguish each separate seal; they raised their heads,

looked at us, then disappeared into the water one by one or several together until none was left.

Then we saw many herds of seals in the water. It seemed to be alive everywhere. At one moment they would pop up their heads right in front of the bow of the ship, swim along in advance of us, turn about and gaze at us, then dive under again all together. The water was simply swarming with them, herd after herd, all making their way northward.

Soon we saw another herd on the ice, in a compact mass like the previous one. They looked like a long, flat, black island rising above the surface of the sea amongst the white floes. The captain fired a single shot at them at a range of 500 yards, and immediately they all dived into the water.

We now sighted several vessels—the “Harald,” “Geysir” and “Morgenen”—and some of them had got a “fall.” There were a good many seals about, but men were already going for them on the ice in several directions.

We proceeded northward without paying any attention to these saddlebacks; there were quite enough people to share them already.

After picking up several bladdernoses which we fell in with, we saw another herd of saddle-backs lying up on the ice a good way ahead.

The “Geysir” had evidently spotted them a little earlier than we did, and was steaming towards them for all she was worth.

We put on full speed. Who would get there first?

The "Geysir" was nearer and had easier ice to go through, but we had a more powerful engine.

From the forecastle we could now see the seals as a black line in front with a few isolated black spots at either side.

Two gunners stood ready to go out on the ice. Great was the excitement. Before long we saw that we were overtaking the "Geysir."

We watched little Captain Iversen up in her crow's nest, where he could only just see over the edge. We heard him shouting and rapping out his orders: "Hard-a-starboard!" "Steady!" "Hard-a-starboard again!"

He was getting more and more excited, and mounted higher and higher up in the crow's nest to make himself taller, standing first on the cleats in its side, and finally right up on the edge of the crow's nest itself, while he shouted and gesticulated to the men at the wheel. He was a fiery little fellow, and one of the crack sealers.

But in spite of all his efforts we left him behind, and presently we were near enough to stop.

The two gunners went out on to the ice, where they crept along cautiously under cover of the hummocks and the rougher ice-floes.

Everybody crowded on to the forecastle to watch; not daring to talk out loud, but exchanging jokes in a whisper.

Little by little the gunners drew nearer. The seals began to be restless, and group after group of them disappeared into the water.

Only five seals remained behind, but these lay com-

paratively quiet. One of them would raise his head now and then as if he felt a little uneasy. He seemed to be the sentinel.

Now the gunners had advanced as far as they could; there was no longer any cover for them. There was nothing for it but to shoot, although it was at such a long range. They raised their rifles, and we turned to watch the seals. The report rang out, but all five seals plunged into the water.

We steamed across to the "Geysir," which had abandoned the chase and was lying to.

Captain Ole Iversen came aboard, but he could not tell us much news. He had been beset for five days after we left him and the other ships on April 18th, and during that time had drifted from 6° E. and 75° N. Lat. to 12° E. Long and $75^{\circ} 25'$ N. Lat. At length the ice had opened on the inner side of where the vessel lay, and he had sailed out that way. He had seen the other ships escape before he did, and supposed that they had re-entered the ice farther to the north.

It seemed increasingly probable that the other ships really had found the young seals. We therefore steered for the north to look for them, and the "Geysir" followed, but was soon left behind.

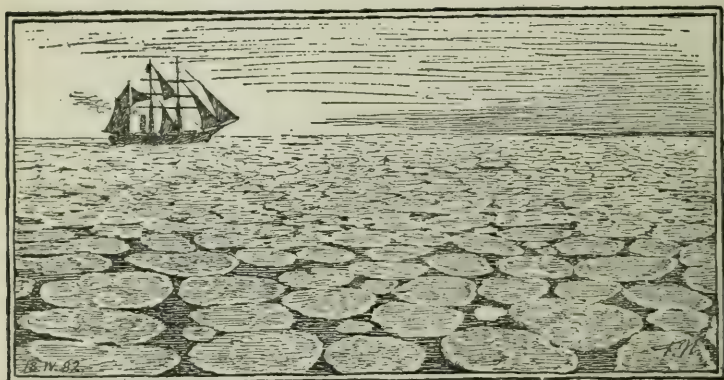
April 18th (16° , breeze from NW) found us as far north as what we took to be the "Great Bight" or the "Bay-ice Bight"; we reckoned that we were approximately in $73^{\circ} 50'$ N. and $10^{\circ} 10'$ E. at midday.

We went on through blue bay-ice and pancake-ice, and after a time sighted the "Haardraade" caught in the ice and charging it.

It was easy to recognize that ship a long way off by her high bow and the bow-sprit pointing upward.

Old Castberg was making a fine fuss now to be sure! And he had a lot of folk out on the ice to cut a lane.

Evidently he had not found the young seals, either, so it was useless for us to spend more time here. We made our way out again and steered southward.



Pancake ice.

It was curious to note the abrupt changes here: at 8 p.m. in fairly open water the water-temperature was 37.2° , which was quite a Gulf Stream temperature for these parts. The air temperature was $17\frac{1}{2}^{\circ}$. At 10 p.m. and a few miles farther to the south-west there was newly formed bay-ice, and the temperature in the water was 29.1° .

Next day (*April 19th*; obs. $73^{\circ} 44'$ N., 11° E., $17\frac{1}{2}^{\circ}$, breezes from S and W) we sighted the "Morgenen" and the German "Jan Mayen." In the afternoon the "Jan Mayen" came alongside, and Krefting and I went aboard her and stayed there till the evening.

It goes without saying that our topic of conversation was the young seals and whether it was worth the coal and the time to look for them any longer.

It seemed doubtful, for we were far on in April now; but on the other hand we were afraid that some of the ships up in the north might have reached the breeding-grounds.

Captain Deuchars told us about life in Davis' Straits and Baffin's Bay, and the whaling there, about netting salmon, about guillemot and duck shooting; he described the ice conditions there, and the shipwrecks.

Then we passed on to the bottlenose and the whaling here among the ice off the east-coast of Greenland. We also discussed the Norwegian sealer "Mjölner," which was going to try the experiment this year of shooting whales from the ship with a shell-harpoon.

Although the Greenland whales had once been so numerous in these seas between Spitsbergen and Greenland and off Jan Mayen, very few were left now, and these kept chiefly to the open water off the east-coast of Greenland inside the drifting ice. Several of the Scotch whaling vessels still went there in June every year after the sealing was over.

Last year one of them—he thought it was the "Hope"—had gone on through the ice for a fortnight before reaching the "land-water." She got two whales.

You never knew what might happen, Deuchars explained, when you were out in those small rowing boats hunting the big whales.

Whenever the harpooner secured a whale he not only

earned his pay for the harpoon shot from the gun, but also an extra reward for each hand-harpoon he could lodge in the animal. Naturally this tempted him to row as close to the whale as he could before he fired.

One day a big whale lay asleep in the sea among some scattered ice-floes. As already mentioned, this species of whale prefers to remain in the small ice, seldom departing from the extreme edge of the ice-field. A boat approached it cautiously, rowing noiselessly and avoiding scrupulously any contact with the pieces of ice. As it slipped silently through the water, the harpooner stood ready by the gun in the bow, with his finger on the trigger.

Well rowed! The boat was drawing nearer at a good pace, while the vast mountain of flesh still lay motionless like a big island in the sea.

Now they were quite close to it. The men sat in such breathless suspense that they almost choked, but the harpooner still waited with his finger on the trigger and grasping a hand-harpoon in his other hand.

Then the boat bumped into the side of the whale; the gun went off the harpoon pieced the huge back, and the hand-harpoon followed, burying itself deep in the animal's flesh.

The whale's huge back curved, and its enormous tail rose and descended with a fearful splash that drenched the crew with spray, while one corner of the tail hit their boat and knocked in the side. Then the animal sounded and the harpoon-line went whizzing out.

The harpooner shouted "Get over to the other side, lads!" while he attended to the line.

The men threw themselves across, and thus kept the broken side of the boat above the water.

The harpooner checked the line round the bollard while the boat dashed onward and collided with an ice-floe. He jumped out on to the floe, and the men hooked the boat fast to it while he went on checking round the bollard until the whale surrendered and was killed by another boat which had come to the assistance of the first.

A whale is killed with long lances, which the whaler tries to drive into its heart, thrusting the weapon through its lungs. The death of one of these gigantic organisms of living muscles, nerves, and warm-blooded flesh is an awe-inspiring sight. When it receives the *coup de grace* through its lungs and death is approaching, the blood that spurts from its nostrils dyes the surrounding sea and ice red. In the last death-struggle its vast tail churns the water into red foam. Then it relapses into immobility, and the mighty giant of the ocean is no more.

As Deuchars told us about the life led by the whalers our own hunting seemed to become very tame and unexciting by contrast, and for a little while we forgot the seals and all our troubles.

The time passed so quickly that it was evening before we knew it, and the captain and I had to return to the "Viking."

Just as we were about to turn in for the night the engine stopped and the captain exclaimed "What's this? They must have sighted a bear!"

I ran up on deck, and hearing that it was a "White-

coat" I jumped into the boat that was just being lowered.

We could see the little creature on an ice-floe, and rowed up to it. This was the first white pup I had set eyes on. It was extraordinarily pretty as it lay there in its snowy coat and watched us with big, innocent eyes. I had a good look at it; but presently it grew restless and tried to make for the water.

We took it alive with us in the boat and rowed back to the ship. There it was placed on the main-hatch and made much of by the men, who were anxious to make friends with it. And indeed it looked as harmless as a tame white cat. But it was not much inclined to respond to their advances. When some of them tried to pet and stroke it, the little creature showed its disapproval by growling and snapping at them.

When left to itself it lay still and huddled up most of the time, staring into space with a sad and downcast look. It refused to eat, though we offered it all kinds of food.

In length it was $35\frac{1}{2}$ inches. It was beginning to shed its coat, for some of the hairs on its hind flippers were coming out, and it must have been about two weeks old. But it was not old enough for the mother to have left it, and she was probably only away on a short swim when we took her young one.

We steamed on. Standing on the forecastle I sighted a big male bladdernose on the ice.

We lowered a boat. It was now midnight, but quite light enough for shooting. The seal was lying upon a big floe, and we were able to approach within easy

range. Anton Askjem took aim, but the shot went off too soon and only splintered the edge of the ice underneath the animal.

It started back in terror, reared up its head, inflated its hood, and glared at us furiously—a stately silhouette against the night sky.

In a moment it would have plunged, but another shot rang out and its head dropped dead upon the ice.

We skinned it; and I discovered that its stomach was full of big rose-fish (*Sebastes norvegicus*). We pulled out three whole rose-fish which were quite fresh and red; the seal must have swallowed them immediately before. They were from a foot to a foot and a half in length; and the stomach contained the remains of at least twice as many.

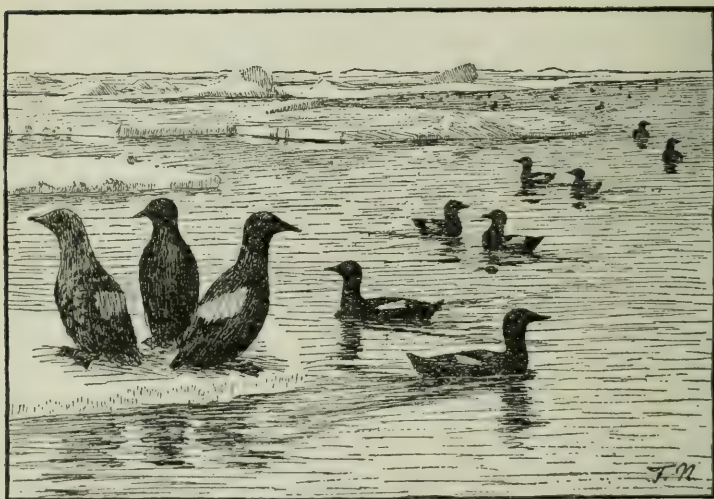
This was a remarkable discovery, for it showed that the rose-fish, usually considered to be a ground-fish, must live in this ocean. But there were no banks here, and the sea was more than a thousand fathoms deep. It therefore followed that the rose-fish could not live at the bottom, but must live higher up in the water at a certain depth below the surface, and was thus a pelagic fish.

The discovery shed an entirely fresh light upon the distribution and habits of this fish. It has been confirmed by the observations which I assisted in making eighteen years later in Norwegian Sea, during our expedition in the "Michael Sars" under the leadership of Dr. Hjort.

Right out in the ocean between Jan Mayen and Norway we caught hundreds of rose-fish on lines set at a

depth of about 150 feet; and it is now certain that the rose-fish is distributed over a large part in this sea, instead of being confined to the coast as we formerly believed. This means a large extension of the area from which the food of mankind can be obtained.

Next morning (*April 20th*, obs. $72^{\circ} 51' N.$, obs. $10^{\circ} 20' E.$, 14° , breeze from N. and NNE), the captain of the German "*Jan Mayen*" came aboard, and it was



Dovekies or Black Guillemots.

agreed that we should look for the breeding-grounds round about the place where we had found the little white seal.

I felt quite sad about that young seal. We could not get it to eat, and it seemed to be pining away. I took it to the cabin to try photographing it on my wet plates and sketching it; but I had not got the heart to torment it any further and so I shot it.

We failed to discover any young seals in this region; they must be farther to the north, so on the following afternoon, (*April 21st*, 25° , wind NE) we headed once more for the north-east. We reckoned that we were then well south of 71.5° N. again.

In the morning of (*April 22nd*, obs. $71^{\circ} 37'$ N., $10^{\circ} 10'$ E., $26\frac{1}{2}^{\circ}$, light wind from NNE) we fell in with the "Haardraade. Our captain paid a visit to Castberg, who was glad to hear that none of the vessels in the south had found the breeding-grounds.

He himself had got loose from the ice the same day (*April 2nd*) that we had left him, but he had been beset several times since then.

He had made up his mind to steer northward like ourselves, and we sailed in open water most of that day. We now saw a good many eiderducks in the water outside the margin of the ice.

On Sunday morning, (*April 23rd*, $73^{\circ} 15'$ N., 11° E., 14° , light winds from N and NNW) seals were reported ahead. The engine was put at full speed and driven to the limit of her capacity so that we might get well in front of the "Haardraade," which was not far off.

Presently we could see the seals from the forecandle, and soon we were close up to them. They lay in a half-circle stretching from dead ahead of us to approximately the starboard quarter.

Six boats were lowered, and I went myself as one of the rowers with Ola Maagerud, the best of the gunners, in order to learn the business.

These boats are of various sizes. The largest of

them are 22 to 24 feet long and have a crew of six men: a gunner who stands in the bow and is in charge of the boat, a boat-steerer who stands aft and steers with a long oar, and four rowers and skimmers. If the seals are numerous the boat-steerer also acts as a skimmer, and in emergencies the gunner lends a hand too.

The smaller boats are about 20 ft. long and have a crew of five men, including a gunner, a boat-steerer, and three rowers.

The "Viking" had ten boats, but most of the ships had only nine.

We set off and bent to the oars so that we fairly shot across the smooth water among the floes. Soon we drew near.

What a sight it was! The seals lay in dense herds away across the floes as far as we could see from the boat. And yet the men assured me that this was merely a little patch of seals compared with a real gathering of old saddle-backs.

The weather was clear and still; and an endless perspective of seals glistened black and white in the sunlight. The air above them quivered with the warmth ascending from all those thousands of bodies.

They were making a sort of humming, murmuring noise, rather like the purring of a pet cat; and now and then a deep, long-drawn 'ho!', somewhat resembling a low raucous bellow, which was the male seal expressing his satisfaction with life.

Seals seem to have an unrivalled capacity for lazing. They will lie practically motionless for hours, either

gazing into space or closing their eyes in blissful ecstasy. Only now and then do they raise their heads and look about them.

In sunshine especially they will stretch themselves out luxuriously, looking the very picture of content. They roll over on to their sides to let the sun bake them, scratch their necks occasionally with their fore-flippers, and waggle their hind-flippers a little. Then they roll over on to the other side to turn their backs to the sun; then right round on to their backs, and then again on to their bellies. Next they open their eyes wide and have a look round; and after gazing vacantly into space for a while their eyes close sleepily again.

This may go on for hours—as long as one has time and patience to watch them.

Then one of them will raise his head to stare at the ship; but it is very far away, so his head sinks down again. Now and then a head sticks up somewhere among the endless succession of backs, gazes around for a moment or two, then goes down again.

The herds are said, as I have already mentioned, to have special sentinel-seals which are exceptionally vigilant in keeping watch over the safety of the herd; and it is alleged that these sentinels are often females. I cannot say whether this is correct, but I have noticed that some of the seals on a floe may be more vigilant and uneasy than the rest. It is advisable to try and shoot these seals first, and then perhaps the others will keep more quiet.

Suddenly a seal raised its head quickly, having evi-

dently seen or heard something suspicious; it stared a bit, then curved its back like a saddle and heaved up its hind-quarters. It spread out its hind flippers like fans—then lay down again rather carefully.

Our boat was steering for the centre of the con-course of seals. We rowed on cautiously, hidden be-



Hunting the Bladdernose.

hind some ice that stood high above the water, and were soon almost within range of the nearest floe.

A few more strokes, then "well rowed!" and we let go the oars, which hanging in the grummets floated in to the sides of the boat as the impetus sent it gliding onward.

We all sat motionless in silent expectancy. By now we were about eighty or ninety yards away.

Ola raised his rifle coolly, aimed long and carefully, fired, and the first seal dropped.

The heads of the other seals started up; another report rang out, and again a head dropped, but the rest of the seals plunged into the water.

As previously mentioned, one should only hit the seal's head, and shoot it stone dead at once so that its head may drop right down on the ice and the animal lie there motionless. When this happens the other seals do not take fright, but, if anything, are reassured by seeing it lie there so quietly.

If its body is hit the seal flounders about on the floe and throws itself into the water, immediately followed by all the others, often over a wide area. It is better to miss altogether than to hit the body of the animal. But a seal's head is not a very large target when you are eighty or a hundred yards away. If the seal is directly facing you, you can also aim at its throat just under the head, and break the vertebra of the neck.

As soon as we had shot our seals, and all the other seals near had plunged into the water, the boat lay to beside the dead seals, and two men—one for each seal—jumped out on to the ice and immediately skinned them as quickly as possible. The skins with the blubber adhering to them were dragged into the boat, and we rowed on towards another floe, where a great many seals were lying; we could approach them under cover of a big hummock.

Ola raised his rifle coolly, aimed long and carefully, his heels. Farther we crept till we reached another hummock where we were within easy range. Here we shot six animals.

In the meantime the other boats had got in among

the seals and we could hear the crack of rifles in all directions. We could see the gunners creeping along on the floes and taking aim; then we saw puffs of smoke, the seals' heads dropped, and last of all the report reached us.

We went on in and out among the ice, shooting on both sides wherever there were seals, skinning the dead seals on the spot, taking the skins into the boat, and then going on again. The shooting was never at really long range, about a hundred yards being the maximum, while we usually shot at closer range than that.

Ola used an ordinary rifle with short cartridges and ordinary loading. An express-rifle kicked too much, he explained, and did not shoot so reliably.

At length all the seals had gone down. On board the ship a flag was hoisted on the mizen-top as a signal that the boats should return.

Now the time had come for the gulls' banquet. Crowds of ivory-gulls assembled in a trice—heaven only knows where they came from—and with harsh screams fell upon the carcasses of the seals. It is curious to see how these birds will keep near the herds of seals as if they knew that they were going to get something by and by. While the gunners are creeping up into range they will fly just above them as if they were merely waiting for the moment to swoop down upon a dead seal; and directly it has been skinned they gorge themselves upon as much of it as they can swallow.

The more timid glaucous gull had become bold

enough now. It came soaring along, circling a few times in the air, then folded its long wings majestically as it alighted near the carcass of a seal, often quite close to our boat. Then it advanced with an air of great dignity, and the ivory gulls respectfully made room for it on the carcass. The malle-mucks lay thick on the water all around, especially wherever a little blood or blubber happened to be floating, and fought greedily over every morsel.

We rowed back to the ship, and the other boats quickly followed. The boats discharged their cargoes in turn as they came in. The skins were fastened together with a rope passed through the holes where the fore-flippers had been, and the bundles thus made were hoisted on board by means of the steam-winch.

As soon as the boats had been emptied they were hauled up into their places under the davits and the key-holes in the bottom opened, whereupon all the blood and small pieces of blubber and strips of flesh which had collected there from the skins flowed out and spread over the surface of the water around the ship, greatly to the delight of the gulls and malle-mucks. If a ship remains stationary in the ice for some time, big Greenland sharks will often appear on the scene and regale themselves with this offal.

The catch that day amounted to 44 seals in all, and our boat did best with a total of 17 skins.

In sealing it goes without saying that there is keen rivalry among the gunners. Their work is a real test of a man's mettle, for it is not merely a matter of holding a rifle properly, nor is it simply a question of luck;

but everything depends upon going to work methodically, navigating the boat properly through the ice, and getting the men to work hard—both at rowing and at skinning—so that no time may be wasted.

A little later on we saw another herd of seals, but we only caught three of them. I measured a full-grown male and found that it was 5 ft. 10 in. from muzzle to tail. Sometimes they may be slightly longer, up to 6 ft. 3 in., perhaps.

The weather in the evening was glorious, with no wind and without a ripple on the water.

We remained stationary during part of the night and were then in about $73^{\circ} 12' N.$ Lat., and $11^{\circ} E.$ Long. according to the reckoning. I made use of this opportunity to take some deep-water temperatures which seemed rather striking. The readings were:

On the surface	29.1°
At 10 fathoms	30.0°
“ 20 “	29.3°
“ 40 “	29.1°
“ 60 “	32.2°
“ 80 “	32.4°
“ 100 “	34.7°

After I had taken the temperature at 100 fathoms I discovered that the reversing mechanism of the reversing thermometer was out of order. This thermometer was fixed in a large piece of wood intended to remain floating upward and thus to keep the thermometer in an upright position until the line was drawn up again, when it would assume the reverse position

and hang downward while it was hauled up. But this piece of wood had ceased to float. All the pores in it had been saturated owing to the powerful pressure exerted by the deep water, and consequently it sank.

This means that the thermometer, when lowered, reversed as soon as the line stopped at the depth where the temperature was to be taken, and thus recorded the temperature before it had had time to adjust itself accurately.

As the air-temperature was 16° the thermometer was rather cold on each occasion that it was lowered; and seeing that it had no time to adjust itself in the deep water the recorded temperatures are probably rather too low and should be increased by several tenths of a degree.

But even if we take the readings as they are, they show how a layer of warmer water may interpose between layers of cold water at 20 fathoms with a temperature of 34.7° , and how we may get a minimum temperature under this warm layer at 40 fathoms, while underneath this again the temperature rises steadily with the depth.

Here we have another series of temperatures which is distinctly at variance with the above-mentioned theory of Edlund regarding the formation of ice in the sea. In this case the surface-water was chilled by the cold air to close upon freezing-point, and was almost congealing, while the layers of water below were much warmer; and there was no sign of undercooled water at any of the depths. The salinity at the surface was evidently more than 32 or 33 per thousand,

increasing downward; and at 100 fathoms there was warm Atlantic water with about 35 per thousand.

This, so far as I am aware, is the first series of temperatures taken which clearly shows how the warm "Gulf Stream water" flows under the cold layer of water of the Polar Current nearer the surface. At a later date I made the discovery that the same phenomenon is present in the North Polar Sea and is common everywhere in the Polar Current.

Here, too, I recorded for the first time the minimum temperature at about 40 fathoms which is so characteristic of the North Polar Sea and the cold upper layers of water in the Polar Current.

But in this region which is so far to the east that it ought to belong to the Gulf Stream these cold water layers are somewhat thinner, and we find the warm water with a temperature of 32.2° as high up as 60 fathoms, whereas in the North Polar Current itself it is usually some thirty or forty fathoms lower down.

On the *24th of April* ($17\frac{1}{2}^{\circ}$, wind from N. and NNE) a good deal of snow fell, and we did not make much progress.

On *Tuesday, April 25th* (33° , gale from NE) we got into some ice where young seals appeared here and there. There were both "White-coats" and "Blue-backs," but there was too much motion and too little ice for us to catch any of them.

"Bluebacks" are, as mentioned previously, the young saddle-backs after they have lost their white woolly coat and attained their seal's dress of smooth coarser pelage, which is light silvery grey on the sides and

belly, speckled with dark markings, while it is darker on the back. Later on this develops into the coat of the adult seal, as already described.

It seemed strange to come across so many young seals here; we began to think that we must be approaching a breeding-ground and our hopes rose once more.

The weather was still thick, with driving snow, but presently we caught a glimpse through the fog of a ship ahead with furled sails, and then of several others.

We steered for the first, which proved to be the "Kap Nord." Why was she lying here? Was she already loaded, and lying here while they flensed the blubber from the skins? Or was she, perhaps, quite near the breeding-grounds, and merely waiting here until the sea became calm enough for sealing operations?

With growing excitement we drew nearer. She began to look suspiciously like a loaded vessel; she was so low in the water. The excitement became positively feverish.

At last we were within hail. Gullik Jensen, the skipper, was standing aft on the taffrail. The first words we heard were:

"Why, where the deuce have you been, Krefting?"

It pierced every one of us like a knife!

Then came the news. The "Nova Zembla" was loaded as full as she could hold, and had no room left for all the skins she had piled up on the ice. The "Vega" had a full cargo, the "Capella" was nearly loaded, and the "Albert" had got 14,000 skins, which was one of the largest cargoes anybody had ever heard

of on a Norwegian ship. The "Hekla" had 10,000 or 12,000 skins, and the "Kap Nord" herself had 6,000.

There were both young and old seals, for the breeding-grounds had been "frozen up," so that the old seals could not escape into the water, and young and old were clubbed together on the ice.

We were regaled with stories of how some of the ships were so fully loaded that they had even filled the boats on the davits with blubber and skins.

That year was almost unique in all the history of our sealing on account of the huge aggregate catch of young seals which the Norwegian sealers brought home to Norway. According to official statistics the total was no less than 83,200 young seals.

This great catch may be attributed to the circumstance that the seals had plenty of time in that year to assemble without being interfered with, and that the entire breeding-grounds then became frozen up, as already mentioned, and so remained without the ice breaking up or separating, while the sealers engaged in their work of slaughter.

The young seals had been only a score or so miles due west of the place where we had been caught in the ice at the end of March, and where we had left the other ships on April 18th. This was exactly what we had thought at the time.

The seals must then have been approximately in $75^{\circ} 12' N.$ and $4^{\circ} E.$ We might actually have seen at any rate the outskirts of the breeding-grounds if it had been clear weather.

The sealing-vessels sailed in among the seals on

Easter Eve or Easter Day, April 9th. According to the "Vega's" log it was in $75^{\circ} 33' N.$ and $9^{\circ} 36' E.$ According to this they had drifted about 90 miles east-north-east in the eight days from April 1st.

This agreed pretty well with what Iversen of the "Geysir" told us. In those eight days he had drifted with the ice from about $75^{\circ} N.$ and $6^{\circ} E.$ to $75^{\circ} 25' N.$ and $12^{\circ} E.$ And when he came out of the ice he was a little to the east of the breeding-grounds and missed them, whereas the others went straight into them.

Such is the luck of the Arctic. The other ships had the good fortune to remain caught in the ice when we forced our way out of it.

This was damping news indeed! Deep disappointment and discouragement could be read on every face on board. To think that we had been so near the young seals and yet had missed them—especially when we might have made such a splendid catch! It was more than flesh and blood could bear.

Especially as Krefting had been so sure that the young seals were exactly where they proved to be! And we had even induced one or two of the other ships to go there.

This was difficult to get over, and we talked of little else on board for the next few days. Heavens, what a share the crews on some of the ships would have! It would be sixteenths and big profits, and no mistake!

We had not obtained any altitude for several days, but according to the reckoning we were approximately in $73^{\circ} 10' N.$ and $11^{\circ} E.$ In that case the ice and the

young seals on it must have drifted about 145 miles (naut.) southward between April 10th and 25th, after drifting about 90 miles east-north-east during the previous eight days.

This gives a good idea of the way in which the drift-ice shifts with the wind. In the period from April 1st to 9th there were chiefly south-westerly winds, while from April 10th to 25th they were chiefly from north-west and north.

In the meantime we had wandered about along the edge of the ice east and south-east of the breeding-grounds without being able to make our way in to them; the ice had been too firm wherever we attempted to enter it in a westward direction; and it was always a serious matter to start forcing a ship through compact ice, using up precious coal and running the risk of being beset, however much one might suspect that the seals were there.

It was not unlikely that the seals and bears which the people on board the "Magdalena" and the "Jason" had seen migrating toward the north and north-east in about 74° N. Lat. and somewhere near 0° Long. had really been going in the direction of the breeding-grounds, and that the seals had originally settled in the ice as far westward as that, but that the ice had afterwards drifted eastward before the west winds.

We were playing for big stakes, for a full cargo of seals was worth a mint of money. It meant a great deal to every man on board, for their pay largely consisted of their share in the catch.

What a world of difference it made which course one steered at the critical moment! We had been just as near to the seals as the others, but there lay these ships fully loaded and with happy crews on board rejoicing at the thought of the substantial shares they would receive—and here lay we with our ship as empty as ever.

VII

THE BREEDING GROUNDS

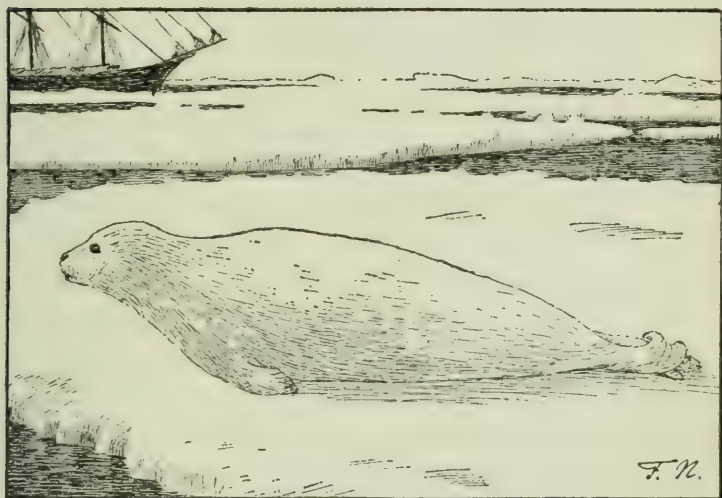
ON the extensive breeding grounds in the Jan Mayen sea the seals lie in their hundreds of thousands scattered for miles over the ice. They are not uniformly dispersed, but usually lie in herds close together on the floes, with numbers of young ones, from six to ten or more on each floe, whilst there may be stretches of ice in between where there are fewer of them.

These breeding grounds may be of quite wide extent, sometimes more than one degree of latitude from south to north, and the seals may then be divided up into large or small herds lying close together at various places within this area. In ordinary years these herds are so sharply defined, that extremely few seals or young ones are seen outside the area proper, and the sealing vessels therefore have to get fairly close before they discover the breeding grounds. The only sign of their vicinity is that seals are seen in the water, migrating in that direction, and, as we have seen, families of bladdernoses often lie on the ice in the neighborhood.

As the "white-coats" cannot enter the water they fall an easy prey to the hunter, and it is evident that the

aim of the latter must be to find his way into the breeding grounds before the young ones have moulted and are able to swim, as after that time they are not so easy to catch and the crowds of seals begin to disperse.

The full-grown seals are shot with rifles, but as has been mentioned above, it may happen, as for instance in 1882, the year of which I am writing, that the floes



A "White Coat," the young of the Saddleback.

freeze solid after the birth of the young ones, so that the mother seals cannot get into the water, and may be killed with seal-clubs on the ice as are the young seals.

In the log-book of the "Vega" (Captain A. Markussen) for 1882, there are the following entries concerning the catching of young seals in that year:—

"Monday, April 10th: Wind N. Westerly, fresh breeze, air thick with snow. At 4 o'clock sighted the

young seals. All hands out on the ice to "heap" (i.e. kill the seals and drag the skins together in heaps). The ice packed closely, crew far from the ship. At 9 o'clock in the evening all on board, set watch, one man on deck."

"Tuesday, April 11th: Wind northerly, light breeze with cloudy atmosphere. At 4 o'clock a. m. all hands on ice killing and heaping. At 9 o'clock p.m. all on board, set watch, one man on deck."

"Wednesday, April 12th: Wind N.-Easterly, air cloudy, off and on with snow. Began killing at 3 a.m., and continued the catch backwards and forwards to the ship. Dragged a number of heaps of skins on board, and then the ice opening, went farther in among the seals with the ship."

"Thursday, April 13th: Wind northerly, light breeze, the air variable, with snow squalls. At 4 a.m. all hands on ice catching backwards and forwards to the ship, shipped a good many young seals. At 9 p.m. all on board. Watch, one man on deck."

Friday, April 14th: Wind westerly, fresh breeze with air cloudy, misty at times. All hands on the ice heaping and dragging seals to the ship, shipped a good deal. At 10 p.m. set watch, one man on deck."

"Saturday, April 15th: . . . At 3.30 a.m. all on ice, killing till 9 a.m. Turned in till 1. All hands on ice killing and heaping seals. At 10.30 p.m. all on board. Set watch, one man on deck."

"Sunday, April 16th: Wind N.-Westerly, light breeze, variable atmosphere with snow squalls. Kept the Sabbath till 12 o'clock midday, afterwards all hands

on the ice to catch seals. At 8.30 p.m. all on board. Shipped some seals. Set watch, one man on deck."

"*Monday, April 17th*: . . . At 4 a.m. all hands on the ice catching seals, heaping and dragging to the ship. At 9.30 p.m. all on board, and set watch, one man on deck. Ship clear water."

"*Tuesday, April 18th*: . . . At 4 a.m. all hands on the ice to and from the ship. Ice tight. Dragged some seals to the ship. 8.30 p.m. all on board."

"*Wednesday, April 19th*: . . . Continued to kill, shipped a number of heaps. At 8 p.m. set watch, one man on deck. Ship clear."

"*Tuesday, April 20th*: Wind N.-Easterly, light breeze with variable air and snow squalls off and on. Dragged some seals to the ship. 8 p.m. set watch, one man on deck. Ship clear."

"*Friday, April 21*: . . . At 5 a.m. all hands on the ice dragging seals to ship. At 7.30 p.m. all on board; shipped about 1000 seals. Set watch, one man on deck."

"*Saturday, April 22nd*: . . . At 5 a.m. all hands on the ice to drag seals to the ship, also shipped all the seals heaped. Total catch about 11,000 seals."

In the following days the blubber was flensed from the skins and the skins were salted. In the end of the month the vessel went northward to catch some old seals in addition before she returned home.

With all their terseness these entries give an idea of this seal catching and the butchery it involves.

When the seals lie close together, a man may in one day kill a couple of hundred of young seals, skin them and drag the skins into heaps. Seal hunters have even

told me that they have killed 300 young seals in one day, and there are those who have even killed more.



A man fitted out for the slaughter of the young seals, with seal club, skinning knife, whetting steel and drag rope.

The ice in the breeding area is frequently so closely packed that the sealers can walk across it from the ship. If the ice is loose, hunting may be carried on from boats.

A man's outfit when going on the ice for this work consists of a seal-club, a skinning knife, a whetting

steel and a rope for hauling. The seal-club consists of a shaft five or six feet long with an iron head, having a spike on one side, a short hammer on the other, and a pointed tip. The seals are generally killed with the spike.

The young seals are hit on the head with this club, and are skinned at once. Five or six skins with their layer of blubber are laid one on top of the other, tied together with the rope and dragged to the ship, or if that is too far off, they are placed in heaps on the tight ice. The heaps are marked with the ship's flag, and are fetched by the boats or by the ship herself, as soon as the ice slackens sufficiently to yield a passage.

The main thing is to work quickly, and in the haste it is not always quite certain whether the young ones are quite dead before skinning. It is said that the skinned bodies sometimes awake to life and go into the water. On the whole it is a trade that has no ennobling influence on the emotions of the men.

From the loads mentioned above, taken in about ten days by the various ships in 1882, it will be seen that very large numbers of seals may herd closely together in this breeding area.

During the next year, 1883, about 121,000 saddle-backs, young and old, were caught by the Norwegian sealing vessels that come from Southern Norway.

In 1858, 10,400 seals were killed in five days from the "Elieser" owned by Svend Foyn.

The extent of the ice and the various factors connected with it in these waters, vary very much from

one year to another, and are to a great extent dependent on the wind and climatic conditions.

The breeding grounds of the saddlebacks in the Jan Mayen sea may therefore vary very much with regard to their position, and are rarely the same two years running. In some years the ice may extend far eastward, and then the great breeding grounds will tend to lie far to the north-east. (This is "east-seal"). In other years there may be less ice, the margin lying far west, and the seals then herd together nearer Jan Mayen, or they are even drifted south-west of that island. (This is "west-seal").

In many years there is a well developed "Promontory" in the ice, and a large and clearly defined "Great Bight," whilst in other years both Bight and Promontory scarcely appear. Thus, for instance, in 1882, when we were there, I had some difficulty in convincing myself that the "Great Bight" or the "Bay-Ice Bight" really existed, however much we ploughed our way north and south through the ice. That year the breeding grounds proved to be much farther to the north and east than in any other known year.

The map on p. 201 shows where the great breeding grounds in the Jan Mayen sea have been since 1853, in every year of which I have been able to obtain information. For one isolated year earlier (1846) I have also found statements.¹ With regard to the breeding grounds in most of the years from 1873 to

¹M. Lindeman: Die arktische Fischerei der deutschen Seestädte 1620-1868. Ergänzungsheft No. 26 zu Petermann's "Geogr. Mitteilungen", Gotha, 1869.

1906, a quantity of valuable information has been published by Mr. Alf Wollebæk,¹ who has also drawn a map showing the situation of the breeding grounds during that period. I have taken my information concerning the breeding grounds mainly from log-books and journals, kept on board sealing vessels,² to some extent also from meteorological journals. For the earliest years I had a kind of diary kept by Capt. Svend Foyn himself on board his sealing vessels, the brig "Haabet" (1853) and the barque "Elieser" (1854-1861).

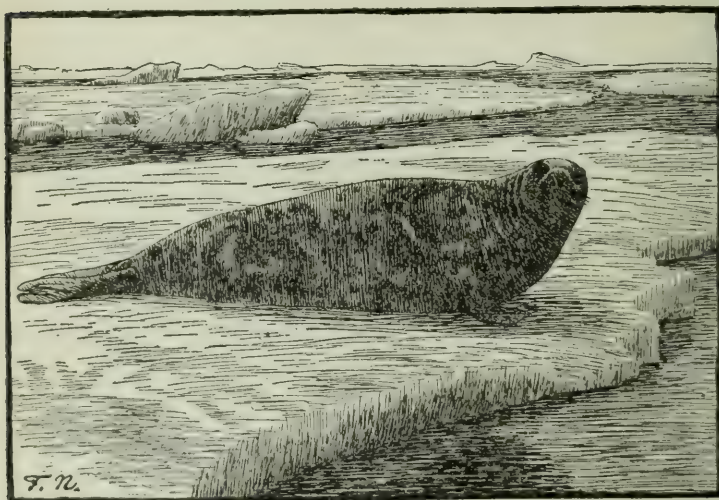
The map shows that there have been great variations in the geographical situation of the breeding grounds, but in most years they have been in the area between 71° and 74° N. and between 0° and 8° W., that is to say where the large ice promontory is found in normal years. (See map in Chapter III).

In considering the situation of the breeding grounds in the various years, it should be borne in mind that the ice may drift considerably after the seals have gone up to bring forth their young, and there may therefore be considerably less difference of longitude and latitude between the places where the mother seals actually go up on to the ice in the various years, and the places where the ships some weeks later hit upon the grounds.

¹Alf Wollebæk: Ueber die Biologie der Seehunde und die Seehundjagd im europäischen Eismeer. Conseil Permanent International pour l'Exploration de la Mer. Rapports et Procès-verbeaux, Vol. VIII, Copenhagen, 1907.

²On the initiative of Mr. A. Hoel of Christiania University these ships' journals have been collected by Captain Otto Sverdrup and Capt. Hermansen. The latter is at present preparing extracts from them for the study of the distribution of the ice in the various years. I beg Mr. Hoel and Captain Hermansen to except my sincere thanks for the loan of these valuable journals.

We have seen how, in 1882, after the end of March, the breeding grounds must have drifted during the first eight days very nearly 90 nautical miles towards east-north-east, and then in 15 days 145 nautical miles southward. The probability is, however, that the place where the mother seals first took to the ice, lay a good distance to the west, or perhaps south-west, of the place where the breeding ground was at the end of March, and the difference between the original situation of the



A full grown female Bladdernose.

breeding grounds in that year and in other years is therefore not as great as the map would appear to show.

During most of the years when the breeding grounds were found south-west of Jan Mayen, e.g. 1855, 1859, 1872, 1878, there was during the sealing season a strong drift of the ice to the south-west, and the

grounds were constantly changing their position. The place where the seals first went up on the ice, therefore, in all these years must have been farther to the north-east, and the variation from the situation of the breeding grounds in ordinary years is then not so pronounced.

It would thus appear, that as a rule the pregnant mother seals go up on to the ice to bring forth their young ones in the area north-east of Jan Mayen, preferably between 72° and 74° N., the longitude varying with the amount of ice. Where the sealing vessels find the breeding grounds a week or two later, largely depends upon the drift of the ice in the meantime, and this movement again depends to a great extent upon the winds.

Apparently the variations of the position of the breeding grounds may be periodic to some extent. They may often lie for several consecutive years far to the north-east, and in other years in the opposite direction. Thus for instance during the decades after 1875, there seem to have been comparatively long periods. During the years 1881-1886 the breeding grounds were found comparatively far to the north-east (or, in 1881, to the east) and the same happened in 1892-1894, and in 1904 and in 1906. It is noteworthy that these periods were also periods of pronounced sun-spot maxima, whilst in 1877, and 1878, in 1887 to 1889, in 1899, and in 1914 the breeding grounds lay comparatively far to the south-west, and these were periods of pronounced sun-spot minima.

During all this time the periods of variation in the

geographical situation of the breeding grounds appear to coincide in a remarkable manner with the eleven years period of the sun-spots. For the earlier years of which we possess reports there exists no such striking accordance, and the position of the breeding grounds seems to have varied in shorter periods.

In 1855 the grounds lay far to the south-west, and it was near a sun spot minimum, but in the following year, when the minimum was still more pronounced, the grounds lay a considerable distance to the north-east of Jan Mayen.

In 1858, which was near a sun spot maximum, the breeding grounds lay unusually far to the east, but the following year, with a pronounced sun spot maximum, they lay south and south-west of Jan Mayen. In 1868 the breeding grounds lay very far to the north-east, but that year was immediately after a sun spot minimum, which occurred in 1867, when the grounds were comparatively far south, but east of Jan Mayen. In 1869, which was nearer a sun spot maximum, the grounds lay chiefly east of Jan Mayen, and in 1871, immediately after a pronounced sun spot maximum, they lay far to the south of the island.

The possibility of a certain relation between the position of the breeding grounds and the periods of the sun spots is not so surprising as may appear at first sight.

The situation of the breeding grounds is markedly dependent on the extent of the ice, and this again is largely dependent on the winds during the various years. These, in their turn, are dependent on the dis-

tribution of atmospheric pressure which, according to our latest investigations¹, again are influenced by the variations in the radiation from the sun, and we may assume a close connection between this radiation and the variation in the number of sun spots. But we cannot always expect to find a close similarity between these variations and the periods in the meteorological variations on the surface of the earth, for we have found that the reaction of the variations in the radiation from the sun on meteorological conditions in any given area of the earth, may often change abruptly to the opposite of what it was for a considerable time previously.

It is questionable whether, as a rule, there is only one such large area of breeding grounds in the Jan Mayen sea. There are those who have maintained that there are several, and especially that besides a large breeding area in the sea, north-east of Jan Mayen, there may be another between that island and Iceland, where the seals from the more southern part of the ocean herd together. The reason for the fact that, as a rule, one breeding ground only has been found, might conceivably be that in most years the whole fleet of sealing vessels has generally stayed in the same area of the Arctic when, judging from the distribution of the ice, they believed the breeding grounds were to be found.

In certain years, according to the log-books, there actually found several breeding areas widely apart.

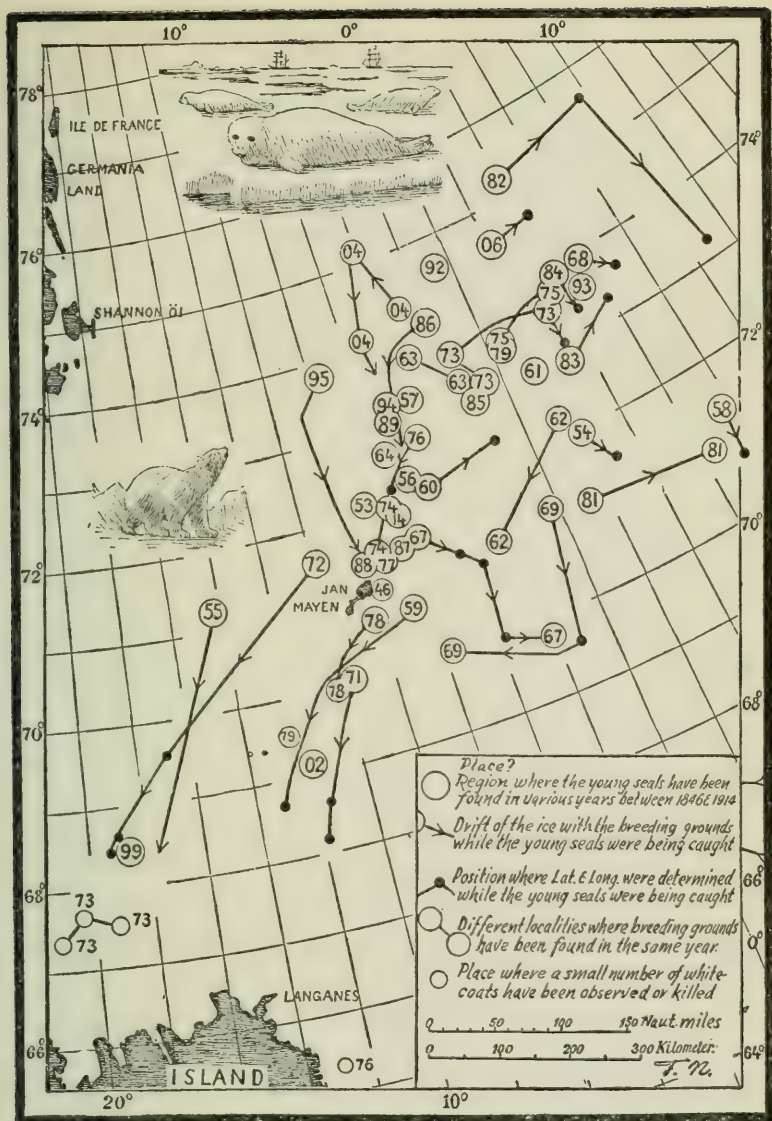
¹See B. Helland-Hansen and F. Nansen: *Temperature Variation in the North Atlantic Ocean and in the Atmosphere*. Smithsonian Miscellaneous Collections. Vol. 70, No. 4, Washington 1920.

In 1873 the great breeding area lay in approximately 73° to $73\frac{1}{2}^{\circ}$ N. and $2\frac{1}{2}^{\circ}$ to $3\frac{1}{2}^{\circ}$ E. According to the available log-books, the men on the "Hekla" (Captain A. Markussen) caught 7000 "white-coats" and 2400 adults from April 1st to 16th. The "Groenland" of Bremerhafen also reached these breeding grounds, and the "Harald Haarfagre" (Captain Carsten Brun) took several thousand "white-coats" from March 26th to April 8th in this region.

After that Captain Brun sailed south-west, and on April 15th, north of Iceland in $67^{\circ} 31'$ N. and $19^{\circ} 23'$ W., they saw a number of "White-coats" on the ice and caught two bears. On the next morning they passed numerous "white-coats" and, at noon, when they were in $67^{\circ} 40'$ N. and $20^{\circ} 27'$ W. they caught 30 "white-coats" and three bears. On April 17th in $67^{\circ} 23'$ N. and $21^{\circ} 21'$ W. they made a fall in the morning, and caught 16 "white-coats," 221 bluebacks (spotted young seals), and 10 adult seals.

The numerous young seals and the three bears indicate that this was no inconsiderable breeding ground. It was late in the year, so that many of the young ones had moulted and taken to the water, as is shown by the catch on April 17th. It was not to be expected, therefore, that any very large number of young ones would be found together.

In 1879 the great breeding ground lay in about $73^{\circ} 21'$ N. and $0^{\circ} 31'$ E., that is to say 180 nautical miles north-east of Jan Mayen. The men on the "Hekla" (Capt. A. Markussen) there took 1909 "white-coats" and 321 adult seals from April 3rd to 13th. They



Breeding grounds of the seals.

then sailed along the edge of the ice and in $69^{\circ} 30' \text{ N.}$ and 14° W. , that is to say about 130 nautical miles south-west of Jan Mayen, they took on April 20th and 21st 51 young seals. These are not stated to be "white-coats," they may have been bluebacks, but the fact that young seals were so far to the south-west so early in the season indicates that they had come from some breeding ground in the neighborhood.

In 1876 the great breeding area lay in about $72^{\circ} 40' \text{ N.}$ and $4\frac{1}{2}^{\circ} \text{ W.}$ On the "Hekla," which did not reach the breeding area that year, they found on April 23rd some "white-coats" in $65^{\circ} 20' \text{ N.}$ and 13° W. , 20 miles off the east coast of Iceland. Twelve adult seals and 3 "white-coats" were caught.

The available journals do not appear to indicate the existence of any breeding ground to the north-east of Jan Mayen, in those years when the ships found the main breeding grounds to the south or the south-west of the island. As a rule, before they found their way to the breeding grounds, the ships made a trip northward along the edge of the ice, to 72° and 73° N. , and there herds of seals were observed migrating south-westward. If there had been a large breeding ground in the north, these herds would have been more likely to migrate towards it.

It seems to me to be probable that in the years when climatic conditions and the conditions of the ice are fairly normal, the bulk of the seals assemble from the vast marine area between Iceland and Spitsbergen, and perhaps even from the western Barents Sea, at one large main breeding ground, which generally speaking

is situated on the "Great Ice Promontory" in the sea north-east of Jan Mayen, if that promontory is well developed.

To this place the seals migrate along the edge of the ice, not only from the north-east, but also in large numbers from the south-west, and after the close of the breeding season large herds migrate back in both the said directions, which makes it difficult to assume the existence of any other large breeding ground in this area.

I imagine that what happens is more or less as follows: During the migration from the north-east along the edge of the ice the seals are constantly on the look out for the best ice and other favorable conditions for a breeding ground. Most often these are found on the "Promontory" which the herds reach after crossing the "Great Bight," but if conditions are not favorable in the north, and no suitable ice is found, (it may for instance be too heavy or too thin), the seals go farther to the south-west. The herds are perhaps led by certain "Leader" seals.

Where some seals go up on to the ice others at once join them, and more and more assemble, these seals being extremely sociable animals. The herds from the south then join and go up at the same place. If these western seals go up on the ice first, before the herds arrive from the north-east, the latter will join the first comers.

But all this does not exclude the possibility that outside the large main breeding ground there may exist lesser ones, at least in certain years, when special con-

ditions in the ice may prevent all the seals from assembling so completely; and from what has been stated above, it appears that there may be a tendency towards the formation of lesser breeding place in the St. Lawrence Bay. It goes without saying that each year a varying number of seals for some reason or other may not find their way to the main breeding ground, and are therefore forced to give birth to their young ones in other places on the drift-ice; and if several of them thus assemble they form their own breeding ground.

It may even happen that they are forced to give birth to their young ones on shore, where otherwise the saddleback is reluctant to go. Such was largely the case during the extraordinary seal years 1902 and 1903, when the coasts of Northern Norway were visited by numerous herds of "Russian Seals" (saddlebacks), and many young seals were born on the outlying skerries, even on the shore of the fjords (e.g. the Varanger fjord, especially in February and March 1903). Many young ones were also born on the Murman Coast that year.

If the seals are disturbed during the time they are assembling ("nesting") on the ice, as for instance by the ice being broken up and dispersed by storm and heavy sea, or by calm weather setting in with extreme cold, so that the ice begins to freeze up, and the seals are threatened with being embayed and prevented from going into the water, then the animals if they have not yet given birth to their young ones, will migrate again, become dispersed, and may form several breeding grounds.

Sometimes, too, the ice is broken up and scattered by storm after the young ones have been born, and the floes with the mother seals and their babies are dispersed over large areas.

For the various reasons here given the main breeding rounds may in some years lie rather scattered, or may be divided into several lesser grounds.

Thus in 1881, the year before our voyage, they were very scattered, and several breeding grounds were found within an extensive area, between about 5° W.



Ice in Denmark Strait.

and $6^{\circ} 31'$ E. in approximately 71° and 72° N. Between April 6th and 17th the men on the "Vega" caught on various breeding grounds 2687 young and 220 adult saddlebacks. During the hunting the ice drifted strongly towards the east-south-east.

By way of example I may also mention 1904, when the breeding grounds lay very much scattered. Between March 27th and the middle of April the sealing vessel "Belgica" found patches with young seals at various places from $73^{\circ} 14'$ N. and $4^{\circ} 43'$ W. to as far

north as $75^{\circ} 15' N.$ and $4^{\circ} W.$, and also farther west in $74^{\circ} 4' N.$ and $6^{\circ} 21' W.$ The bulk of the seals were in approximately $74^{\circ} 11' N.$ and $3^{\circ} W.$, where on April 1st and 2nd 1060 seals were caught.

Considering the long periods during which seal-hunters have visited these breeding grounds of the saddlebacks in the Jan Mayen sea, catching seal by the thousand every year, first German and British sealers, and later on, after 1847, Norwegians too, it may seem remarkable that the herds of saddlebacks have not diminished in these waters still more than is actually the case. For many years past there have probably been caught at least 150,00 to 200,000 young seals annually, and it might be thought that in the years when the seals had had an opportunity of assembling undisturbed, when the ice was not broken up by storm, and the ships had sailed well into the breeding ground, the great majority of the young ones would have been taken, in addition to a number of the adult seals.

That which has saved the seals from complete extinction must be the circumstance that, in years when the breeding ground has been broken up, the seal-hunters have not been able to catch the greater percentage of the newborn seals; moreover, as has been pointed out above, there may always be a considerable number of seals that do not reach the main breeding ground, but bear their young ones in other places, and thus escape being killed. Another thing, which has perhaps saved still more seals, has been the decline in the price of seal-oil, so that the catch was not very remunerative for the large well-equipped vessels.

Added to this, the crews have become far more expensive than they used to be, and they will no longer work and toil during the hunting as the lads in the old days delighted in doing. With an eight hours' day no one would have done much sealing, for at that time you had to toil on as long as there was a seal left on the ice.

VIII

NORTHWARD AFTER THE ADULT SADDLE- BACKS AND SOUTHWARD AGAIN

DURING the following days we tacked backwards and forwards in the ice, waiting for better weather, and hoping to catch any seals that might still remain. It was thick weather, with snow falling, but we managed to pick up a few young seals here and there on the ice, although they did not amount to much.

Early in the morning of *April 28th* (Obs. $73^{\circ} 15' N.$ $10^{\circ} E.$, 23° wind NW) I was awakened by the news that a bear was in sight.

I was on deck in a twinkling ready to go on to the ice. The bear was just visible with the naked eye from the deck as a dark moving spot. Through the telescope it could be seen prowling along and falling through the thin ice every once in a while. It was evidently a splendid animal, but alas! it was going away from us, and we could not pursue it. There was little wind for our sails and steam was not up.

We sailed on northward in order to find the old seals, and entered what we thought must be the "Great Bight"; it had just been covered with ice during a con-

tinued spell of cold weather, and we ploughed through new bay-ice all that day and the next.

We saw a dark sky in all directions, indicating that there was not very much ice except this new blue bay-ice.

Then we went through some stretches with larger floes, and during the night of *Sunday, April 30th* (about $75^{\circ} 24' N.$, $9^{\circ} 30' E.$, 23° , light wind from NNW and ENE and E, snow squall) seals were reported. Two boats were lowered.

The sun was now up night and day, and as we rowed away from the vessel at midnight, it broke through the banks of clouds to the north, and bathed the northern sky in orange flames. But the seals were timid, and were only lying on a few floes. Moreover it was very difficult to proceed through the bay-ice that lay everywhere between the floes. Ola Maagerud only succeeded in shooting a couple of seals in the water.

When shooting seals in the water the chief thing is not to shoot the animal in the head, because in that case it generally sinks, but when the seal is afloat and bobbing up and down looking at you, you must wait for the moment when it is high enough, and then send a bullet straight through its throat, thus severing the vertebra of the neck. The blood will then stop the wind pipe so that the air cannot escape from the lungs, and the seal will usually keep afloat until you can reach it and strike your seal-club into it. Later in the year it grows so lean that it usually sinks at once even when shot in the neck.

The seals went in herds, and wherever there was a

patch of open water, seals heads bobbed up everywhere. They were particularly numerous in the wake of the ship, where we often saw crowds of them.

On *Monday, May 1st* (23° , light wind from ENE) our position according to observation was $76^{\circ} 28' N.$ and about $8^{\circ} 9' E.$, and we believed ourselves to be still in the "Great Bight," which we had been crossing for three days from $73^{\circ} 20' N.$ There was hardly anything else to be seen but bay-ice.

In the forenoon the captain in the crow's nest gave the word to get ready for "fall". The word "fall" invariably causes the same feverish excitement on board a sealing vessel. Hunting clothes are taken out, the skinning knives are honed once more, men keep running up and down to get up on the forecastle or near the bulwark and look for the seals. No one can sit still a moment.

At least we drew near the seals. They covered an area extending for about five miles, lying up on the "streams" of white floes. But in between the floes there was new bay-ice which would make it difficult for the boats to proceed.

Two boats were lowered; Ola Maagerud was to steer one, and the captain took charge of the other. I went in the latter boat.

The boats rowed together towards the middle of the long stretch of seals. Ola Maagerud was to row in one direction along them and we were to take the other.

It was hard work breaking our way through the bay-ice. Often we stopped altogether, but far worse was

the noise of the ice breaking against the sides of the boat. It could be heard far away.

We rowed towards a floe as carefully as we could, but before we got within range the seals dived into the sea, frightened by the noise.

Sometimes we had to hack our way through, forcing down the ice under the bow. It was weary work, but we advanced little by little. The great thing was to toil on steadily and methodically.

At last we were within range of another floe. Everything was quiet in the boat; one must not even turn one's head. The captain levelled his rifle. Crack! The head of the nearest seal fell forward, and the animal lay there as dead as a door-nail.

Some of the other seals plunged into the water at the report, or possibly at the sight of the smoke.

Another shot, and another head dropped. Every shot was accompanied by a joke from the boat-steerer, Kristian with the nickname "Balloon," standing in the stern of the boat.*

A little farther on was another floe with seals on it. The range was rather long, one man said 170, another 200 yards, but the seals were getting restless, so the captain took aim and fired. The "Balloon" commented: "He's done in." Another shot. The "Balloon": "Another bullet wouldn't hurt him." Yet another report: "Now he's done in."

So it went on. The distance had often to be some-

*Why he had got that name I never could find out. He had certainly no resemblance to a balloon; he was as lean and tough as a hound.

what great in the difficult bay-ice with the low floes and scarcely any cover.

The captain was shooting well. When quite young, before he had a ship, he was well known up in the Arctic as a good shot.

The weather was fine and calm, and the seals would have been quite an easy prey, had it not been for the noisy bay-ice which made it so difficult to get within range.

The seals lay basking and purring in the sunshine. On several floes they were packed so closely together that we could hardly see the ice between them.

On one large floe there lay several hundred seals; the captain declared that he had never seen so many on one floe before.

Anticipating a great victory, we agreed to shoot together. But the moment we were within range, they all tumbled pell mell into the sea, and all we got was a single seal which the captain shot. I shot two, killing them, but they were already on the move, and their impetus carried them over the edge of the ice into the water.

There I stood, with nothing to show for my first attempt as a gunner on the sealing grounds; perhaps, it was not so easy as I had thought.

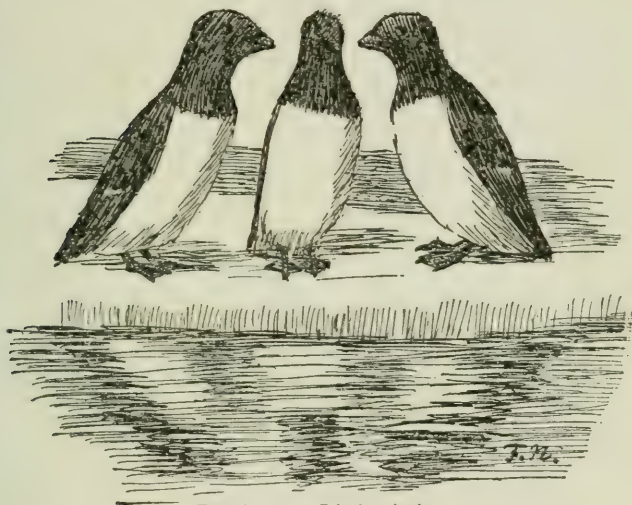
At last there was not a seal left, and we returned to the "Viking."

In all we got 66 seals that day.

At noon on *May 2nd* (19° to 23° , light N. wind) when we were in $76^{\circ} 34' N.$ (obs.) and about $10^{\circ} E.$ the man in the crow's nest reported that Spitzbergen

was in sight. I went on deck. Above the horizon to the east a few yellowish white specks were visible, but I could not say whether they were clouds or snow-clad mountains.

But from the crow's nest I could discern a series of rather clearly defined mountain peaks, two of these standing close together, appeared to be taller than the rest. I made them out to be the Hornsound Peaks.



Rotches or Little Auks.

It was a long time since we had seen any land, and I cannot deny that I felt a secret longing for the herds of reindeer and the bird rocks of Spitzbergen, and for a chance to stretch my legs on *terra firma* once more for a while.

There were flocks and flocks of rotches in the water between the floes, and their cackling, or rather laughing, cries could be heard in all directions. They

evidently belonged to the nesting cliffs on the coast, and had come out to find food in the sea.

Two snow buntings came and alighted now on the davits, now on the yards. They were pretty creatures to look at, and their bright chirping was very cheerful.

Next morning we saw a gyrfalcon on a hummock.

We had now entered a tract of scattered heavier ice-floes. The captain considered that this ice had not come from the northern side of the "Great Bight" but rather from the east, from the Spitzbergen Sea. This, however, was doubtful.

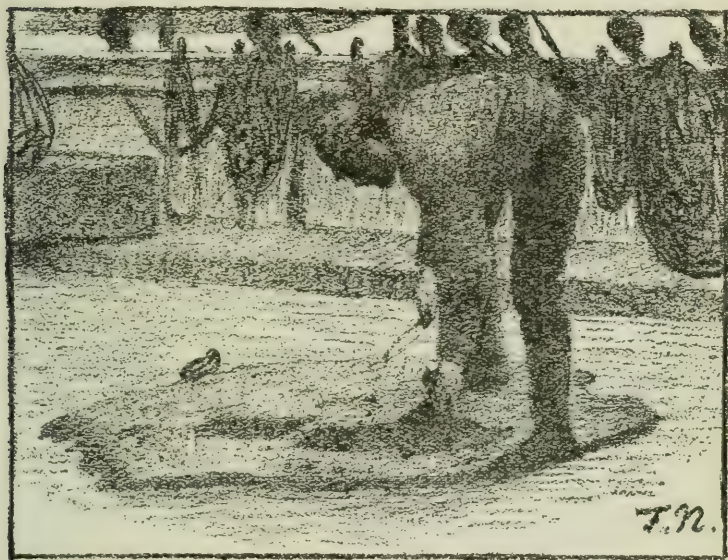
Next day, *May 3rd*, (about $76^{\circ} 11' \text{ N.}$, 12° E. , 25° , slight breeze from NNW) we were nearer to Spitzbergen, but there was a fog off the land and there was not much to be seen. As no seals were to be found in those waters we stered westward once more.

On *Thursday, May 4th* (about 76° N. , $3^{\circ} 28' \text{ E.}$, 21° , wind from NNW) we had a fall in the evening. I was out with the carpenter, who was also a gunner. The weather was bad, a strong breeze and heavy sea, and much bay-ice, so that we often stuck fast, and had to punt our way along between the floes against the wind. It was heavy work. We only got one seal in our boat, although we were out for five hours; 33 seals were shot in all, and Ola Maagerud was again the best.

We continued our voyage, mostly through bay-ice, with here and there a hummock, and as there were no seals to be found we began on *May 6th* (76° N. , $3^{\circ} 20' \text{ E.}$, 25° , wind N.) to steer southward. The water re-

mained cold, 29.1° in the afternoon, with 25° in the air. Bay-ice was still forming.

On board the time was spent in work of all kinds. The numerous crew had to be kept busy, so that they should not have too much time on their hands, and grow discontented with life in general, and with the



Removing the flesh adhering to the blubber on the skins.

catch, which so far had been unsuccessful. When there were no more skins off which to remove the meat and flense the blubber, there was nothing but ordinary ship's work on the rigging, polishing, scraping, painting and so on.

As I have said, it is a lazy life when there is no hunting. The chief occupation then is eating and sleeping. During the watch on deck, there is not much to do be-

yond the work of the two men at the wheel, except perhaps a little bracing and setting of sails.

During the off-watches, when you are not asleep you are busy with cooking. The frying pans are in use all day for'ard in the galley; every one has something to fry for himself, and there is an everlasting dispute about whose turn it is to use the frying pans, for there is not space enough for many at a time.

They heap up the pan with potatoes, soaked bread, fish, bits of meat, and whatever they may have collected, with as much butter and fat bacon as possible. There must be fat, if possible quantities of it.

The Arctic sailor likes nothing so much as butter and pork. Money has no value, but you can buy whatever you fancy with your rations of butter and fat pork.

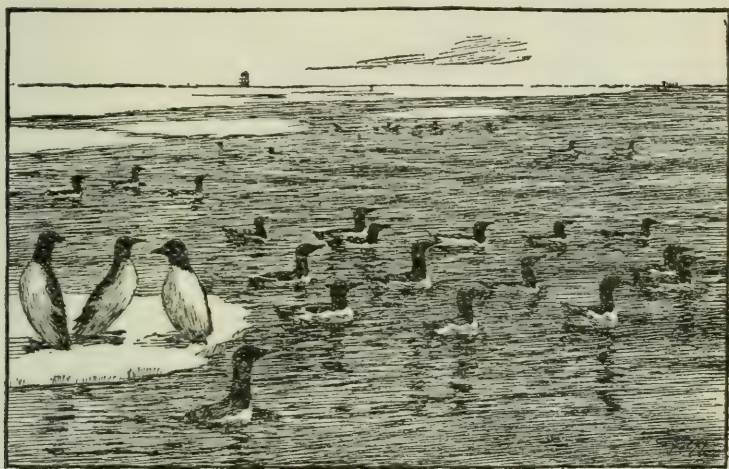
As soon as a man has fried his food he eats it straight away, and it is absolutely incredible what mountainous plate-fulls of fatty food will disappear. Afterwards comes coffee, if it can be had from the cook. Then a smoke and a gossip, and perhaps a game of cards or dominoes. But very soon it is frying time once more.

The consequences did not fail to appear. I could see some of them swelling out rounder every day, indeed, some of them downright dangerously. They came on board lean slim youths, but now they were gigantic "fat boys," with cheeks like cherubs. What would they be before the end of this voyage!

Often enough this overeating on fatty food led to difficulties, and not unfrequently the men would come to the captain, who acted as a doctor—complaining of

"pains under the chest." He invariably gave them asafetida, or some such hellish concoction apparently with excellent results. Anyhow they never appealed to him twice.

The captain and I carried on bird-shooting from the ship, killing guillemots and dovekeys with saloon rifle. Sometimes we took a boat and went to shoot the guillemots that lay in flocks in the ice bays; there was generally a steady flight of them up and down along the



Guillemots.

edge of the ice. When these flocks flew past the boat within range, we had to be very quick. They fly at a tremendous speed, and before you gain experience you generally miss, but once you have learnt to aim several yards in front of the bird, you do better, and find that they are not so difficult to hit, having an even flight.

One bird after another fell into the water. Some

we shot on the water, or when rising to the surface near us, and little by little we had quite a presentable pile of them at the bottom of the boat, and they made a welcome addition of fresh meat to our table.

When we thought we had got enough we returned to the ship, and how cosy it was after the cold sea trip to enter the warm cabin, get rid of sea clothes and sea boots, and sit down to the steward's good dinner that awaited us. Afterwards there was usually a peaceful hour as we sat in opposite corners of the sofa with our pipes. When all was said and done, life was good, in spite of stubborn seals and still more stubborn ice.

Target shooting for the gunners was carried on upon the ice when opportunity offered. They shot with their sealing guns including both express rifles and ordinary rifles.

On deck we shot a good deal with my saloon rifle. I was in good practise, and was considered quite a good rifle shot. But one day while we were practising, a rifle cartridge was put up on the forecastle and I was challenged to hit it with the saloon rifle. This seemed an easy enough thing to do, but to my astonishment Hans, the joiner, bet me a quarter of a pound of tobacco that I could not hit it. I accepted this bet and shot, but missed time and again, losing first a quarter of a pound, then half a pound and finally one whole pound. The captain laughed, maintaining that he would be able to do it, but he also missed several times. Everybody roared with laughter.

I could not understand what was wrong. Was it the wind that turned the bullet aside? Then I noticed that

the sight was all on one side. General hilarity ensued, but I felt sure that that rascal Hans had played his part in the accident. Then I had another go at the cartridge. I shot three times in succession, and the bullets pierced and re-pierced the same hole until the thing barely hung together. Hans would not accept another bet.

On *Sunday, May 7th* (about $75^{\circ} 30'$ N. and 5° E., $26\frac{1}{2}^{\circ}$, light breeze from N.) we continued south and south-east through the bay-ice all day. Both the captain and I noticed that remarkably few malle-mucks with white breasts were to be seen, and this had been the case for quite a long time. At first we saw many, but it appears that the older ones with a white breast are mostly found out at sea, and that those within the ice are mostly grey. We also saw a flock of seven snow buntings.

In the afternoon the captain saw a "troll seal" (witch seal) bobbing his little head up through an open place in the bay-ice. The sealers maintain that this is a special kind of quite small seal.

Needless to state I was anxious to secure a specimen of this remarkable animal, but they are only seen very rarely and always alone—a solitary, mysterious creature.

Much of the heavy ice is often colored red underneath, and the sealers call it "seal ice," asserting that the seals prefer to go up on such ice.

We went through a good deal of red ice that day, and I had a boat out and fetched a block on board in order to make an examination under the microscope.

I found that the red color was due to tiny microscopic plants which cling to and grow on the lower surface of the ice in the water. They were mostly various species of diatoms, *inter alia* of the genera *Navicula*, *Fragilaria* and others.

Quite inexperienced as I then was in microscopic investigations, I jotted down a rough pen sketch of what I saw in the microscope, which gave a comparatively weak enlargement.

Professor H. H. Gran, who has done me the kindness to look at this sketch, considers that the form *a* is "probably the species *Navicula directa*, which is common in the Polar Sea. The form *b* "is almost certainly a *Fragilaria*, probably *F. oceanica*, which is a typical form of Arctic plankton. The round cells (*d*) are probably the same as the rectangular ones with rounded corners (*c*), viz. box-shaped diatomaceæ such as *Thalassiosira gravis* or *Landeria glacialis*, which, together with *Fragilaria oceanica* are characteristic forms of Arctic plankton. In the main, therefore, they seem to be forms of plankton (i.e. forms which float loose in the sea) although they were found on the underside of the ice."

In some places the floes were so red underneath from these plants that the sea almost looked like blood when the ice had been crushed by the bow of the ship.

Krefting gave it as his opinion that this sort of ice was usual in "the Promontory" where the breeding grounds are. This seems not unlikely. In places where the ice is reddened underneath by these plants large quantities of them must be present in the sur-

rounding water. These plants are the food of various small creatures, e.g. small crustaceans, and these again provide food for the seals, especially the young seals, either directly or else indirectly through their being eaten by larger creatures which in turn are eaten by the seals.

When going southwards (*May 7th*) we saw several seals in the water. They appeared to be looking for floes to mount, but the latter are rare here, owing to the prevalence of bay-ice. At several places the seals had been on this, but they do not like it, because they cannot lie comfortably enough on such thin, snowless ice. Nevertheless half a score of "bluebacks" were seen here and there on the bay-ice that day.

We were now tired of looking for saddlebacks. There were too few of them to be had, and therefore on *May 8th* (obs. $74^{\circ} 46' N.$, $7^{\circ} 25' E.$, $26\frac{1}{2}^{\circ}$, light breeze from SW) we turned south-east, so as to leave all this bay-ice, and set our course south-westwards going for the bladdernoses in Denmark Strait.

On *May 9th* (obs. $73^{\circ} 55' N.$, obs. $8^{\circ} 4' E.$, 32° to 30° , light breeze from SE) the flesh-stripping was carried on. This means that the sealskins with the blubber on them are carefully freed of all meat which may have remained on them at the time of skinning. The meat is thrown overboard and crowds of malle-mucks gather round the ship. They fight for the bits as they are thrown out, and it is fearful and wonderful to see what a malle-muck can swallow, and the speed with which everything disappears.

I threw my tow-net over one and took it on board

alive. He gulped up big bits of flesh as soon as we took hold of him, and set him down on deck. While there he could not fly away, as he was unable to get enough air under his wings, and he could only walk about. After a while we let him loose again.

After the flesh has been removed from the blubber adhering to the skins, these are flensed, i.e. the blubber



Flensing the blubber from the skins.

is cut away from them. This is done in the following manner. The skins are hung over what is called the "flensing bench" with the blubber outwards, and the hairy side next to the smooth, sloping wooden board of the bench. The blubber is then cut off the skin with a long, sharp flensing knife, which is passed carefully along the inner side of the skin in a downward direction; and this must be done so accurately that no blubber remains on the skin, and no cuts are made in the latter, for that would reduce the value of the skin.

It is skilled work, needing much practice; for which reason it is usually entrusted to a few picked men.

The blubber is cut into strips and put into the blubber tanks. After the removal of the blubber the skins are carefully cured and laid in layers on top of one another in the curing bins in the hold.

During the following days we continued south and south-west, mostly in open water along the edge of the ice, and only now and then caught a few seals on the promontories of ice that jutted out into the sea.

In the evening of *May 10th* (in approximately 72° N. and 8° E., 32°, light breeze SSE) we saw an animal rarely met with in these waters nowadays, a large Greenland Right Whale (*Baleana mysticetus*) who came up several times not far from the ship, spouting high up into the air. It is easy to distinguish from the large fin whales by the fact that it has no fin on its back, and therefore it and its lesser relative the North Cape Whale are called smooth backs. In former times there were great numbers of these valuable whales in the northern waters, mostly along the edge of the ice towards Spitsbergen. During the 17th and 18th centuries, in particular, whole fleets hunted them chiefly because the vanity of women demanded the long valuable "bones" for their corsets and crinolines. The blubber was used, amongst other things, for oil in lamps.

The Greenland whale (or the North whale) does not grow as long as the blue whale and the big finner. It is rarely more than 60 feet, in exceptional cases 65 feet in length, but it is very bulky and heavy. The

width of the body, at its thickest point, is very nearly one-fourth of its length; the average animal yields seventeen to twenty tons of oil, and large specimens up to twenty-eight and thirty tons. The total weight of the whale is then about seventy tons.

To propel his enormous body through the water it has a tremendous tail, the breadth of which may be up to 18 or 25 feet.

The head of these animals is gigantic, its length being nearly one third of the whole body. A whale 50 ft. in length will have a head about 15 ft. long, and the longest "bones" will be 11 ft. 2 in. or even $12\frac{1}{2}$ ft. in the largest whales.

There is a respectable gulf when he opens his mouth, and yet he lives entirely on small crustaceans (copepods and others) and the *pteropoda* ("whale's food", *Clione*, and *Limacina*), which abound in the sea along the ice in such quantities that the water is often colored by them. The whale enters these shoals, opens its mouth and fills it, and when the water runs out through the rows of "bones"—one on each side, and each row consisting of more than 300 bones—all the tiny animals are strained off and swallowed. But a great deal of food is needed by such a body. The thickness of the blubber may be up to 10 to 20 inches.

This whale is always found in the open drift-ice, or near the edge of the ice, preferably among broken-up ice where it can find plenty of food. As I have stated above, there were numbers of them in earlier centuries in the sea to the west and north-west of Spitzbergen and near Jan Mayen, and when during the 17th and

18th centuries especially the hunting was being carried on, by a fleet of costly ships, two to three hundred vessels might gather at Spitzbergen and nearly 2000 whales were caught every year. Thus, for instance, in 1697 A. D., 1959 whales were taken near Spitzbergen by 188 vessels, and that was not an exceptionally good year. In 1701, 2616 whales were caught.

This hunting was mainly carried on by the Dutch and English, but also by Danes and Norwegians, Frenchmen, Spaniards (Basques) and Germans and as is well known, serious disputes arose concerning harbor rights in Spitzbergen, until an agreement was made and they divided the country between them.

But then this whale seriously decreased in numbers. As early as the beginning of the 18th century, after 1719, a number of the whalers shifted their hunting-grounds to Davis Strait and Baffin Bay and the western coast of Greenland, and Danes and Norwegians carried on whaling in those waters from fixed stations on shore. Thus Holstensborg was founded in 1724, chiefly for the sake of the whale-hunting.

Even at the beginning of the 19th century some whales were caught in the sea west of Spitzbergen, but by that time they were being caught more in the drift-ice nearer to the east coast of Greenland. In 1814, which was an exceptional year, the English caught 1437 whales in those seas between Greenland and Spitzbergen, but since then the number of whales has decreased alarmingly. Now there is not a Greenland whale to be seen in the sea near Spitzbergen, and there

are not many left within the drift-ice near the east coast of Greenland.

Why do these large animals disappear completely from certain areas, though they may be found in considerable numbers in other areas not very far away? Is it true, as many maintain, that they avoid the areas where they have been hunted most, and that the whales seek shelter farther in among the drift-ice where they are more difficult to catch?

I believe the explanation to be a different one. The whales have their regular seasonal wanderings in the ocean, and each tribe of whales follows its own route. During the winter the Greenland whales of the sea between Greenland and Spitzbergen live farther south, perhaps north of Iceland.

In spring they go northward along the edge of the ice to the areas where they live during the summer, and these areas vary in the case of the different tribes. A large number of them formerly lived off the coast of Spitzbergen, or in the sea west and north-west of it, others lived farther in among the drift-ice or in the open waters off the east coast of Greenland.

That it was not because of the hunting at Spitzbergen that they were driven to the east coast of Greenland is proved, among other things, by the fact that as early as 1684 or 1686 some Dutch vessels went through the drift-ice to the Gael Hamke Bay on that land, in about 74° N. and found many whales migrating along the shore to the southwest. Three of these vessels caught 60 whales, and the others also returned with full cargoes. Thus there was already a fully

developed migration of whales in these waters at that period, while there were still hosts of them near Spitzbergen.

The disappearance presumably started in the following manner:—First the large tribe of whales which spent their summers near the Spitzbergen coast was destroyed. That did not take many years. Then the whalers turned their attention to the tribe which lived in the sea farther west along the edge of the “Western ice,” until this tribe also became extinct, and they had to seek those that had their summer grounds farther within the drift-ice, nearer the east coast of Greenland, and this tribe has not yet been fully destroyed.

There are two distinct areas where these whales were mostly caught: “the south fishing ground” between 70° (the mouth of Scoresby Sound) and 75° N. where the largest whales were found, and whither they came after the middle of June, and “the north fishing ground” north of 77° N. and up to 80° and 81° N., if the ships could get so far. Between $75^{\circ} 30'$ and 77° N. whales were but rarely seen.

It would seem that the whales migrate along the edge of the ice, preferably a little within its margin, at the end of March, that is to say about the season when the saddlebacks assemble, and also in April. Then in the autumn, in August and September, they return southward again along the coast of Greenland.

But as I have already said, there are not many left, and those which exist scarcely appear to multiply, a mother whale with a calf being now a rare sight.

The well-known whaler, Captain D. Gray, who has

fished whales in these waters for many years, declares that during all the years while he was whaling, he did not see more than six mother whales with young ones, and he did not catch a single whale that did not bear scars from being harpooned before. He recognized several of the whales from year to year. For instance they saw one whale "with a large white splash on its back" for seven consecutive years in the same area, etc.

There appear to be some few Greenland Right whales left in the area west of Greenland, in Baffin Bay and Lancaster Sound. These also migrate northward in spring and southward in autumn. But this tribe does not intermingle with that living east of Greenland, and it is undoubtedly extremely rare for a whale from one tribe to join another.

We do not know what age whales can attain, but they may certainly live to an exceedingly great age, if they are not caught.¹

The entire history of these whales, as I have told it above, is a shame to humanity; it shows how far we have yet to advance before we become genuinely rational beings. In one area after another we are extirpat-

¹As an interesting incident showing how local the Greenland whale is, I may mention that in September, 1894, Captain M'Kay on the "Terra Nova" caught an unusually large whale in Davis Strait. In the blubber was found a harpoon marked "Jean of Bo'ness" and dated forty years previously. The "Jean" of Bo'ness was lost in Davis Strait in 1857, and that whale had probably lived all those years within the same area.

After 1882 only a few Scottish whalers have fished east of Greenland, but the number of whales has decreased. According to Southwell's statements in 1883 there were caught in this area 1 Greenland whale, in 84: 11, 85: 12, 86: 15, 87: 3, 88: 4, 95: 11, 96: 6, 97: 1, 98: 0 (and none seen), 99: 1, 1900: 0, 1901: 0.

ing one of the largest animals on earth, and one that does no damage whatever; and we cannot even agree to spare them sufficiently to keep them in existence so that they may be of lasting and certain utility to us. It seems as though human beings in their insatiable greed are wilfully blind.

From where he sat on the bulwark the captain sent a longing glance after the whale, and said:

"Well, boys, if we only had that fellow on board, the whole voyage would be paid for."

The long whale-bones alone in a good whale like that are worth a fortune.

There were also numerous bottlenoses (beaked whales) about, and evidently there was plenty of food in the sea suitable for whales. The water was dirty brownish in color, but its surface temperature remained cold, 30° , all day.

That night we had the midnight sun—it just touched the horizon at midnight.

Next day, *May 11th*, ($71^{\circ} 16' N.$, $7^{\circ} 15' E.$, $35\frac{1}{2}^{\circ}$, breeze from E.) I saw a bird that might have been a sparrow hawk, which came and sat in the rigging, but I could not definitely decide what species it was. It may have been a merlin (*Falco aesalon*).

The water was now beginning to get warmer. At 4 o'clock in the afternoon it was 34.7° , and at midnight 33.6° .

IX

THE BOTTLENOSE WHALE .

ON Friday, (*May 12th*) (obs. $70^{\circ} 42'$ N. Lat., $2^{\circ} 50'$ E. Long., 35.6°) there was a dead calm all day, with a sea that looked like a polished mirror, and we lay drifting near the margin of the ice. We were still in good time for the bladdernose sealing, and the captain did not think we could afford to use up our coal on the voyage westward; we must wait for a wind. The water remained warm: 34.7° to 35.3° .

We saw numbers of bottlenose whales, often lying quite still in front of the bow or in our wake. Herd after herd bore right down upon the ship, then went round her and inspected us from every point of view.

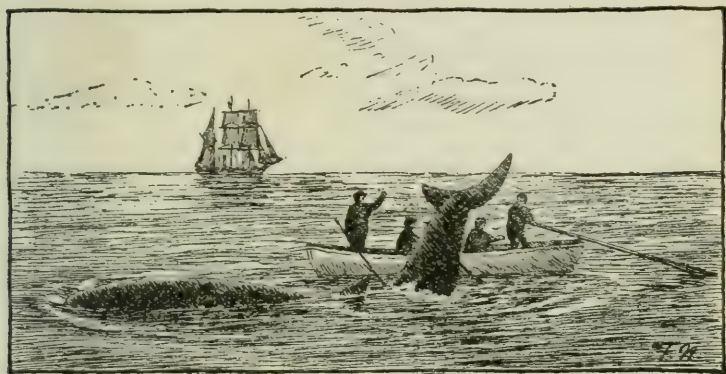
I regret to say that we made several attempts to shoot them with our express-rifles; but they took no notice. Then we decided to fire a volley.

Three bottlenoses were heading straight for us; they came up astern, and one of them stopped and lay motionless about 20 yards away from the ship. The gunners stood together on the half-deck aft. Counting up to three we all blazed away, but the whale lifted his tail high in the air, lashed the water with it, and

disappeared. Some blubber which it left floating on the surface was much appreciated by the gulls.

The whale did not worry itself much about our bullets, apparently, for we afterwards saw it swimming along quite gamely with the others. We knew it was the same one by the gulls which gathered on the water wherever it had been, no doubt finding blood and blubber there. After that we gave up all attempts to shoot these creatures.

The captain suggested that it might be interesting to lower a boat and see how near we could get to them.



The whale heaved up its tail, brought it down with a splash, and dived.

This was accordingly done and we rowed towards one or two whales which were lying quite still. We were able to approach so near that we could almost touch them with our oars. Then suddenly they lifted their tails in the air, brought them down with a whack that drenched the boat with spray, and disappeared. Presently they came up again close to us, swam round the boat and had a good look at us from every point of

view, then lay just under the surface of the sea, turning on one side to watch us with their small eyes.

Once the captain laid hold of the tail of one of them with the boat-hook. The whale heaved up its tail, brought it down with a splash, and dived. If we rowed on a bit they followed, half a dozen of them at once swimming alongside of us, now a little in front, now a little behind, but always quite close to us; they were evidently extremely inquisitive.

I cannot deny that we wished we had possessed some sort of instrument to fasten on to these big fellows, for they would have been sporting steeds to drive, as Markussen once discovered when he "harnessed" one of them. He told us the story himself on board the "Viking."

"I couldn't bear seeing all this blubber going a-begging year after year in the sea round my ship," he related, "without having a shot at getting some of it aboard. So one year I brought out a supply of harpoons and lines from home.

"Well, one fine day I saw a lot of bottlenoses about. So I rigged up a boat with a harpoon, and took three whale-lines to be on the safe side. There were four men to row and one at the steering-oar aft, while I myself stood by the harpoon in the bow. Well, we soon fell in with a fine fellow who came up right ahead of the boat. When I stuck the harpoon into one, he made a hell of a splash and then sounded; the line ran out so fast that you could smell burning. I suppose I ought to have taken a turn with the line round the bollard to check it, but I didn't dare. The first line ran

out, and the second soon followed; then he started on the third line, and it ran out every bit as fast as the other two had done.

"I began to be afraid he'd make off with that line too. So I stuck my hand under the last coil, took hold of the end of the rope and made it fast to the thwart.

"But out went coil after coil, and the pace seemed to be just as fast as ever. And when he had taken the lot of it he pulled the boat under too, straight on without a stop; down it went, and left us behind kicking about in the water.

"The men yelled like the devil—they couldn't swim; but I told 'em to stow it, and gave each of 'em an oar to hang on to.

"As luck would have it the "Vega" had steam up, and could come at once and haul us out.

"But them fish are the very devil to stay under water. Though the sea was like glass and we kept a sharp look-out from the crow's nest all day in the hope of seeing our boat, neither boat nor fish did we ever see again. He certainly didn't come up anywhere between us and the horizon.

"I felt pretty sore at losing such a good boat.

"Well I wasn't going to risk another boat, but I thought I'd be even with him all the same. Next year I took some petroleum casks with me. I rigged up three of these casks, fixing them on to three new whale-lines, and laid them all ready at the bottom of the boat.

"Then we started out again. Well, I made fast to a fish, and down he went in the same way. The first line ran right out and we chucked the first cask over-

board. But he pulled it on down with him full pelt as before, without stopping a moment. Then the second line ran out, and we chucked the second cask into the water, but it just went after the first and disappeared in the same non-stop fashion; while the third line went running out as fast as though we hadn't had any casks at all.

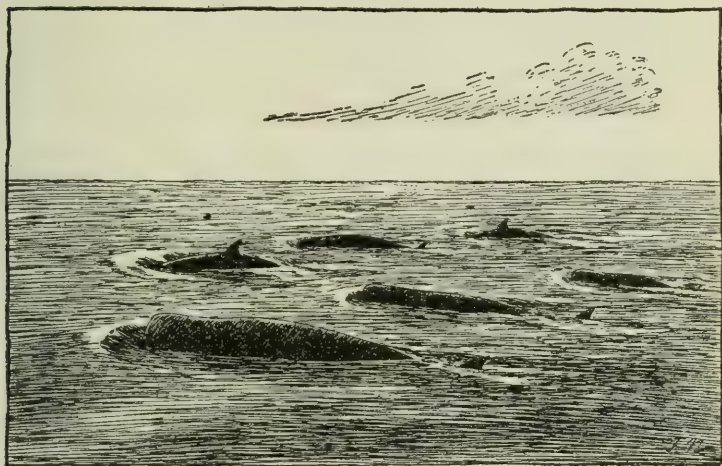
"At length we chucked the last cask overboard; but I'll be hanged if it didn't go under every bit as quick as the others. So we'd lost the whale and the lines and the casks, and we never saw them again. This whale didn't come up anywhere within sight either, so far as we could make out.

"Who'd have thought the old fish had so much go in him? Anyway, I gave him up after that."

Of course the reason why the petroleum casks never rose to the surface again was that as soon as they got some little distance down the pressure of the water crushed and broke them. Moreover the pressure in deep water would saturate all the pores of the wood of which they and the boat were made, rendering them so heavy that they sank. That, so far as I know, was the earliest Norwegian attempt to catch the bottlenose, but things soon changed.

Up to then the Norwegian whalers had not tried to catch this kind of whale, but a few of the Scottish sealers, headed by Captain David Gray, had hunted it during the last two or three years, and in May and June of the year in question (1882), 203 bottlenoses were killed. In this year one or two of the Norwegian sealers began doing the same. In the following year

two small Norwegian vessels were fitted out exclusively for this kind of whale fishing. The interest in it grew rapidly; in 1884 four Norwegian vessels caught 211 bottlenoses, in 1885 twenty-two vessels caught about 800, and in the nineties sixty vessels caught an average of about 3000 bottlenoses a year. But of late this form of whaling greatly declined owing to the comparative scarcity of whales.



A herd of Bottlenoses.

The bottlenose (*Hyperoodon rostratus*) is a rather remarkable animal in several ways. It owes its name to the fact that its forehead is domed in the shape of a big hump resembling the shoulder of a bulky bottle, while its jaws project below like a slender beak or bottle-neck. In the case of the old male, or bull, this humped forehead is particularly large, rising perpendicularly in front. When the bottlenose rises and swims on the surface of the sea its forehead only, and

not its jaws and mouth, shows above the water; and unless one happens to know to the contrary one may easily mistake this vertical forehead for the front of the whale's head.

Inside the hump is a cavity which in the female is filled with a kind of transparent oil which contains spermaceti; this oil, being a valuable commodity, is carefully preserved by the whalers. In the males "there is a solid lump of fat" instead of oil.

The male, which is larger than the female, may measure from 26 to 31 feet in length, while the female may measure up to 25 feet.

On an average this whale will yield one ton of train-oil, though as much as two and a half tons may be obtained from one of the old males.

While young it is dark in color, looking almost black in the sea, while the belly is but little lighter than the back. As it grows older it becomes lighter; the old males, in particular, are often light-colored, and the belly assumes a whitish hue.

The bottlenose is one of the toothed whales, i.e. it has teeth instead of whalebones, and is the next largest to the sperm-whale or cachalot. But its dentition is extremely inadequate, for it consists of only one, in rare cases two small front teeth (from $\frac{3}{4}$ to $1\frac{1}{2}$ in. long) on either side of its lower jaw. Only the points of the teeth project above the gums; they are quite useless, and are frequently lacking altogether. There are no teeth as a rule in the adult whale's upper jaw, but the young whale is said to possess rudimentary traces of teeth which are quite loose in the gums.

In the dim ages of the past the ancestors of these whales must unquestionably have been as well equipped with teeth as the other toothed whales. But a period of degeneration set in; they began to live on small creatures in the sea-water which they had no need to seize or masticate with their teeth. The consequence was that their teeth gradually disappeared until there were none left but these two and possibly a few little survivals of teeth, rootless and embedded in the gums—to tell the tale of their former glory. We find, however, the beginnings of a complete set of teeth in the embryo of this whale.

Very likely the same fate is in store for the human race, when they have lived for a sufficiently long time upon porridge and pudding and minced up food. One or two eye-teeth, scarcely showing above the gums, may some day be all that survive to remind us of the epoch when man was a beast of prey equipped with a complete set of teeth.

When I was curator of Bergen Museum, some years after the voyage I am describing, I received a conclusive proof that the bottlenose does not use its teeth; for a tooth of this whale was sent to me with several large-sized barnacles (i.e. stalked cirripeds of the species *Conchoderma auritum*) attached to its tip. This is the barnacle so often seen adhering to the bottoms of ships and pieces of drift-wood. In the present case they had evidently been hanging out of the whale's mouth and had thus been travelling about in the sea. But it seems almost incredible that the whale can actually make so little use of its gums in eating that

it does not dislodge these big barnacles from the tips of its teeth.

And yet we are told that everything in nature has its purpose and use. Whereas in reality there are only too many useless and even injurious survivals of the past to weigh us down, mentally as well as bodily.

The æsthetic sense must vary in a curious fashion among the whales. While the bottlenose has gradually eliminated its teeth, and many other species have even replaced them by ugly black whalebones, the male narwhal has fashioned its teeth into a long lance of finest ivory, projecting from its mouth for a distance of over eight feet, which is equivalent to half the length of its body and three or four times that of its skull. This lance is a spiral extension of the eyetooth, usually on the left side of the upper jaw, and being confined almost entirely to the male fish it presumably represents a decoration, like the antlers of the stag, intended to render the wearer more attractive to the other sex. Obviously tastes differ widely even in the animal world. Whether the males use their lances as a weapon in fighting for the female, cannot be stated with certainty. At all events the narwhal, like its relatives, is destitute of teeth for purposes of mastication.

The bottlenose in these northern waters lives mainly upon various kinds of cuttle-fish, which are present there in large shoals; it can also eat herrings and other shoaling fish.

Being of a gregarious nature it usually prefers to go in herds. When migrating these herds may be

several hundred strong, but on the spring and summer fishing-grounds the bottlenose generally goes in smaller herds of two or three, or five or six, and occasionally as many as a score of whales together. Often, however, they are seen alone, especially the old bulls, which presumably have passed the age when they take an interest in the other sex or their fellow creatures in general.

As a rule the herd does not leave a wounded companion as long as it is alive, and it therefore may happen that the whalers capture the whole herd.

It is a remarkably good-tempered creature, and never attacks the whaling-boats. As it is devoid of teeth with which to attack its enemies, this lack of pugnacity is not at all surprising.

The element of danger in catching this whale is due to the circumstance that it is hunted in row-boats, for with its rapid and violent movements the bottlenose may smash the side of the boat if it comes too near, or may pull it under if the harpoon-line gets stuck. It is difficult to kill. A full-grown male may run out seven hundred feet of harpoon line and remain under water for more than an hour.

Like the migratory birds, this whale undertakes long migrations in spring and autumn. In winter, from November to January, it prefers to live in the ocean somewhere near the equator, while in spring it assembles in large herds and travels northward to feast upon the shoals of cuttle-fish in the regions near the Arctic Ocean, to bring forth its young, and to mate. In

short, it is in the north that this whale, like the migratory birds, really enjoys life.

About the middle of April, and sometimes as early as March, isolated herds migrate northward past the Faroe Islands and distribute themselves over the sea to the east and north-east of Iceland, coming as far northward as the region where we fell in with them, or even farther still.

It invariably keeps away from the ice, and is very loth to go under the ice-floes, even when these are lying scattered. It cannot, therefore, be regarded as one of the genuine Arctic whales, and it prefers to frequent the regions between the warm Atlantic Ocean Current and the cold Polar Current, where it is able to find plenty of food. During most of the summer it remains distributed over these waters.

It is here that these whales bring forth their young, usually in late spring, and mate shortly afterwards. As a rule there appear to be several females to each male.

At the end of July they migrate farther southward to the regions east of Iceland and near the Faroe Islands, where many of them are caught in September. After that they assemble in herds and proceed southward to the tropics.

The flesh of this whale is quite palatable, like the flesh of other species of whales, but its blubber and train-oil, being strongly aperient, cannot be eaten. This fact was known to the Norwegians in very early times, and is mentioned in *The King's Mirror* (about 1240 A.D.), where we read in the description of the

whales around Iceland: "Furthermore there are two kinds of whale; one is called the "And-hval" (Duck-whale) and the other the "Svin-hval" (Pig-whale),¹ and the largest of them does not exceed 50 feet in length; and these fishes are not edible, for the fat which runs off them cannot be digested by human beings or any other animal, for it runs right through them and likewise through wood; indeed it is well-nigh impossible to preserve if it stands for any length of time, even when stored in horns."

The Eskimo are also quite familiar with this property of the bottlenose, for which reason they call it *Anarnak*, i.e. that which purges. This by no means prevents them from eating it. A Danish doctor living on the west coast of Greenland told me that on arriving at an Eskimo settlement one day he could not see a soul about, and nobody came down to the beach to meet him as they usually did.

When he came to the houses he found all the inmates, men and women alike, so ill that they had to stay indoors; for a dead aperient whale had been washed ashore the previous day, and they had all over-eaten themselves on it.

On *May 13th* (obs. 70° 34' N., 13° 3' E., 35½° to 32°, wind NW.) there was again wind enough for us to sail on westward. Seals were reported on a strip of ice ahead of us. We kept on along this strip of ice

¹Both names obviously refer to the bottlenose or beaked whale, alluding to the circumstance that its snout resembles a duck's bill or a pig's snout. The pig-whale seems to be a name for the female and the young males, in which the hump on the forehead is not so prominent.

and saw a few seals here and there, and the boats were lowered one by one along the edge of the ice.

I was to try my hand for the first time as gunner, and was put in charge of a boat with a crew of five.

Having been lowered into the water we rowed towards the seals. It was very rough among the ice; huge seas came rolling along through the floes, which were bumped against each other with such force that we had to exercise the utmost care to avoid getting the boat crushed. The sea constantly washed over the low edges of the floes and created a backwash. And shooting was no easy matter when tossing about in this fashion.

The seals were all blue backs, a year old, which would be much more timorous than the older seals.

The first one we rowed towards disappeared into the water long before we were within gunshot. After that we had better luck, and succeeded in killing three seals on a floe. To end up with we were even more fortunate, for we killed every seal we saw.

Two seals were lying asleep, side by side on an ice-floe. At intervals one of them raised its head to look round. At last I managed to get within range, after the boat had had a difficult struggle against the backwash from a floe that we were obliged to pass.

We were well within range, but now neither of them would raise its head. I waited, but in vain. Then I took aim at the nearest one, although it was awkwardly placed. I fired, but it remained as motionless as ever, and the only indication that it had been hit was the

stream of blood which began to melt a round, red hole in the ice in front of it.

The other seal raised its head slightly at the sound of the report, looked about, glanced at its companion, saw that the latter was still lying quiet, and so remained lying quiet too. But it lay much too quiet, and would not lift its head again, so I could only see the top of it behind the dead seal. Never mind—I would have a shot; but the bullet only grazed it. The seal raised its head quickly enough now, and hurried off towards the water. Another bullet stopped it just at the edge.

As we moved on we saw two seals lying in the surf, one on each side of a floe. I shot one of these, and the bullet carried away a good piece of its neck. It lay where it was with an utterly bewildered expression in its staring eyes, until another bullet blew away all the top of its head. I sprang on to the floe and ran across it to see whether the other one was still lying there. I came down almost on top of it; and it jumped up and made off. A bullet blew its brains out; but it slid on along the ice and into the water, where it sank, for I could not stop it without a seal-club and had therefore no choice but to stand helplessly by.

There were not many seals here, so our hunt was soon over. The flag was run up, and we had to return to the ship. Our boat had caught thirteen, and 33 had been shot altogether. We had the most, and Ola Maagerud came second. Karl Andersen, another of the gunners, had been unlucky enough to get one side of his boat staved in when passing through the rough water among the floes.

Next morning (*May 14th*, obs. 69° N., obs. $0^{\circ} 10'$ E., 31.3° , wind NNW) we passed one of the Scotch sealers, and saw the "Capella" astern of us. As she sailed faster than we did she soon overtook us, and Captain Bryde came aboard our ship and stayed the rest of the day with us, while the two ships sailed in company towards the south-west.

The steward was instructed to provide the best dinner he could, and that meant a good deal. Coffee and cigars or a pipe followed. Bryde told us about the sealing, and described how the breeding-grounds this year had been situated on firmly frozen-up ice, so that even the fullgrown females could be killed on the ice; in consequence of this they had caught a comparatively large number of the old ones among the "young seals" this season.

His ship had reached the breeding-grounds later than the other sealers, with the result that his cargo was not so large as theirs. It had been a piece of "good luck" for them to remain stuck in the ice for so long; for when they at last escaped they immediately fell in with the young seals.

Captain Guy of the "Nova Zembla" had of course got free on the same day as ourselves; but the secret of his success was that as soon as he had emerged from the ice that moonlight evening (April 1st) he had run into some companies of seals that we never saw, and which were heading straight for the interior of the ice. This had convinced him that the main body of the seals were assembled to the west of where we then were.

Later on we took a stroll on the half-deck aft. The

weather was sunny and fine, with a blue sky and sea. Far away to the north-west we could see the white sheen where the edge of the ice-field lay. The air was still rather cold, being 31.3° at midday, but one did not notice this in the sun.

The "Capella" was following us at a reasonable distance; they could not keep her full for fear that she should outsail us. Now it is a curious fact that nothing is more difficult for a skipper than to admit that his ship does not sail so well as another. Krefting consoled himself with the thought that the "Capella" might sail faster in this easy weather, but when it came to a gale they would soon see which was the better ship.

As usual we sighted a number of bottlenoses in the course of the day; and the two skippers agreed that we Norwegians made a great mistake in not laying ourselves out to catch these big creatures and make some use of them.

Bryde seemed to enjoy himself on board our ship, for he stayed to supper; and it was late at night before he was rowed back to the "Capella."

The dirty green and brownish color of the sea had become very noticeable, especially in the propeller well, where it had been azure blue when we were among the ice in the north. This dirty color of the water is due, as I have said, to the quantity of small plants and animals that are present in it, for the most part small algæ, largely diatoms, which form the food of innumerable small crustaceans; these in their turn are eaten by the shoals of cuttle-fish and herrings, which in their turn again are eaten by the bottlenose. This is

why there are so many whales in these waters. The temperature of the water was as high as 38° , but colder near the ice, where it was below 32° .

Next day, *May 15th*, (obs. $68^{\circ} 32'$ N., $1^{\circ} 55'$ W., 32.4° , wind from SSW.) we passed the Scottish sealer "Eclipse," which was engaged in catching bottlenoses. The entire deck of this ship was covered with the tails of these fish. It was her captain, David Gray, who had started the capture of the bottlenose a year or two before.

We could now see occasional land-birds, such as the curlew and the snipe, and on *May 16th* (approximately in $68^{\circ} 29'$ N., $3^{\circ} 27'$ W.) I caught a pipit. The air temperature kept at a little over 32° —between 33° and $35\frac{1}{2}^{\circ}$.

The *17th of May*¹ ($37\frac{1}{2}^{\circ}$, wind SW) was duly celebrated; grog was served out to the crew, and the day's work ended earlier than usual.

The day after was Ascension Day (obs. $67^{\circ} 45'$ N., $6^{\circ} 47'$ W., $37\frac{1}{2}^{\circ}$, wind SW.), and we kept the festival. The crew whiled away the time with all sorts of games in the sunshine on deck. They had "pull-fingers" and tug-of-war, but the most popular game was "leg-hooking."

I soon discovered to my surprise that I was the best at this game; I overthrew the whole crew and one after another they rolled along the deck, while uproarious merriment greeted the downfall of each new competitor. The only one I had any difficulty with was the

¹Constitution Day in Norway, commemorating the adoption of a constitution on May 17, 1814.

tall sailorman from Hedemark, who was difficult to lift up and stoutly resisted my efforts to turn him round.

All of a sudden the captain, who had been standing as an amused spectator for a long time, said that he would have a try.

I looked at him with some surprise, but of course I was quite willing to accept the challenge. We lay down on our backs with our right sides close together and our legs in opposite directions as usual. After getting a good hold with our right arms linked through each other, we raised our right legs. Lifting mine high up I hooked it around his leg, and quickly sent him rolling along the deck like a ball. The crew roared with laughter.

The captain rose to his feet with a laugh, protesting that I had started too soon, before he had got properly into position. He said he would try again, only I must give him a little more time on this occasion.

We lay down once more, and I gave the captain all the time he wanted. At length he was ready, and up went our legs. I hooked mine well round his and began to pull, but this time he had become strangely heavy. I tugged away, but could not get him to budge. I tugged harder still, and bent his knee right down over his head, but even then I could not pull him round. The crew were beside themselves with laughter.

But now he began begging for mercy and yelled to me to let go. I did so, and looked round to see what was the matter. Then I saw that the skipper had stuck his left foot through a ring-bolt on the deck, thinking to out-manceuvre me in that way, but he

hadn't done so after all, and I had very nearly split him in two, much to the delight of the crew, of course.

A favorite game in fine weather is one called "throwing at the fool's cap." A number of squares are drawn with chalk on the deck and you have to stand at some distance away and throw disks, preferably made of lead, on to these squares, which have different values; according to the squares upon which the disks lie you win a greater or smaller number of points, but if you are unlucky enough to throw a disk on to the square known as "the fool's cap", you lose all the points that you have previously won.

The prize is invariably the same, viz. a quid of tobacco. This is cut up in pieces an inch or half an inch, or when tobacco is scarce about a quarter of an inch, in size; and the men will play for these bits of tobacco for days on end.

We were still sailing in the same brownish water, and this continued until *May 19th*, in approximately $67^{\circ} 10' \text{ N. Lat. and } 7^{\circ} 33' \text{ W. Long.}$; it then began to disappear, and we only saw it when our tacks brought us close to the ice. The temperature of the water for the most part kept between 33.3° and 35.6° . We were now cruising westward under sail, with a wind from the south-south-west.

We saw a great many bottlenose whales everywhere in this region. On the morning of *May 20th* (obs. $67^{\circ} 0' \text{ N., } 9^{\circ} 4' \text{ W., } 37\frac{1}{2}^{\circ}$ in the air, 33.3° to 33.8° in the water, wind SSW) I also saw a cow with her calf; they were swimming side by side; but we did not pass near enough for me to have a good look at them.

The calf appeared to be about nine or twelve feet long and must have been more or less new-born.

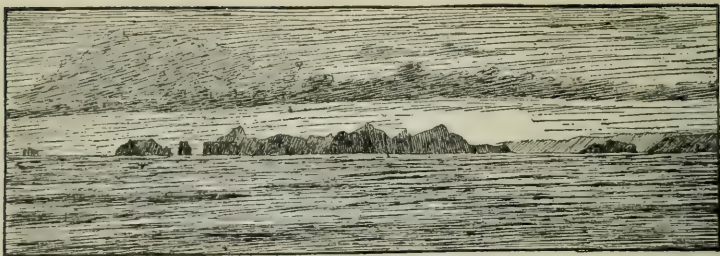
I noticed that several of the big bottlenoses have a white mark on the front of their head. This was usually on the old males with specially large vertical foreheads. I have already alluded to the peculiar fact that the forehead on the male fish is much higher and more vertical than that on the female.

A large whale—probably a blue-whale—came up close alongside of us. What an enormous brute! First its huge head emerged, cutting the water with the bridge of the nose, which resembled a sharp, narrow keel; next it spouted, hurling a jet of water as high as the ship's top, while the air around quivered as it does when steam is escaping from a large boiler; and after that up came its whole back, down to the little fin. The great creature seemed to be almost as long as the whole ship as it shot past us and dived down again, a perfect embodiment of speed and invincible strength.

May 21st found us in $66^{\circ} 31' \text{ N.}$ (obs.) and about $12^{\circ} 19' \text{ W.}$, temperature 39° , and still near the edge of the ice-field; in the evening we sailed through a good deal of scattered ice. The water temperature had fallen again to 30.7° .

We were now about 56 miles east of Langanes, and had obviously entered that branch of the Polar Current which flows south-eastward along the coast of Iceland and is commonly termed the East Iceland Arctic Current.

We wanted to steer round the northern coast, but



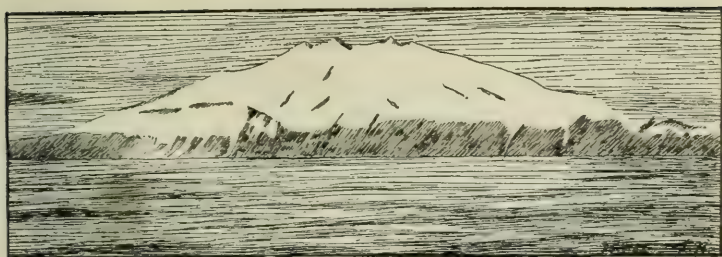
The Vestmanna Islands.

there seemed to be a large amount of ice there which might be difficult to navigate. Moreover the weather was very foggy and visibility poor.

For these reasons we continued on a south-westerly course in order to pass round the east and south of Iceland.

Several very calm days followed, and being unwilling to waste coal by steaming when we were in such good time for the bladdernose sealing we chiefly lay still and drifted, sometimes in beautiful sunshine, but more often in a fog which was so thick that we could not see the land.

The crew whiled away the time by fishing for malle-mucks. They had merely to hang a line with a bit of blubber on a hook over the side, and the birds would come at once and fight for this bait. Kristian Ballong was particularly devoted to this form of sport; he skinned and roasted the malle-mucks he caught, and declared that they had a remarkably fine flavor. But the worst of these birds is that their plumage has such a disgusting smell that it is no joke to approach too near them.



Eyjagalla-Tokull.

I inspected those which were caught and found that they were all male birds and nearly all had white breasts.

As we proceeded farther southward the water became warmer and to some extent the air also. On *Wednesday, May 24th*, we had sailed right round to the south of Iceland and were in $62^{\circ} 49' \text{ N. (obs.)}$ and $17^{\circ} 17' \text{ W. (obs.)}$ while the temperature of the water was 46.4° at noon and 45.7° in the evening. This was quite southern warmth and the air was $45\frac{1}{2}^{\circ}$ at noon and $46\frac{1}{2}^{\circ}$ in the evening.

On *Thursday, May 25th*, in approximately $62^{\circ} 39' \text{ N.}$ and $19^{\circ} 10' \text{ W.}$ (41° in the air and 46.4° in the sea), there was no wind first thing in the morning; but a gale from the south-west suddenly arose, at the same time that a heavy swell came rolling up from the east. The appearance of the sea was very remarkable; the waves hurled themselves against one another, dashing the spray high into the air on all sides. It resembled an immense boiling, bubbling cauldron. The gale was a stiffish one, and the ship reeled and tossed about in

the sea so violently that we sometimes thought we should lose our jibboom.

But the weather cleared in the evening, and gave us a view of snow-peaks rising above the sea in the north. This was Eyjafjalla Jökull on the south coast of Iceland. A little later on we sighted the Vestmanna Islands as well.

What a magnificent sight it was to see this volcanic cone, covered by a white snow-glacier like a mantle which completely enveloped its sides down to the dark cliffs at the base, rising 5430 feet straight up out of the ocean!

The glacier was all aglow where its edges turned toward the sunset; and the long line of the Vestmanna Islands, with their wild and rugged lava shapes, stood out darkly against the red sky. We had reached the time-honored isle of the Norwegian sagas.

When I came out on deck next morning (*May 26th*) we were lying becalmed a mile away from the coast. I climbed up into the crow's nest at once to have a look at the land.

It was strange to see snowless earth and mountains again. Although there were not exactly any green meadows or burgeoning trees it reminded me of spring, and I was longing to feel the ground under my feet once more. I could see horses and sheep grazing, and there were people working in the fields.

On the sky-line behind us rose Hekla and Tindfjalla-Jökull and the other Jökulls, glittering in the sun against a pale blue sky. I could also discern some snowy mountain summits ahead which looked like

white tents pitched on the top of the dark coast; these were the two peaks of Snefjells-Jökull.

There was no lack of sea-birds here. Gannets, now singly and now in line, kept flying past us. As for the big skua gulls, "Iceland's crows," they had met us several days before, a sure sign that Iceland was not far off. Flocks of guillemots were scattered thickly over the shining surface of the sea. Now and then we would hear the clear note of a passing curlew, and large flocks of kittiwakes were accompanying the ship.

We got up steam now with the intention of going towards Reykjanes to see whether there was any codling to be caught between the Ness and the "Sack of Flour"—the big rock shaped like a sack which sticks up a little way farther out in the sea and is the home of the gannets.

Having run in under the lee of the land we stopped, and a fishing line was put out.

"Have you reached the bottom?" I asked. "No . . . but I've caught a fish though!" said the man with the line, as he struck in a way that showed me it was a big one too; and up came a big lively codling.

This was "a bit of all right," and a scene of great animation followed. A lot more lines were produced and one after another the big cod and coal-fish were hauled up. Everybody was demanding the gaff at once. Now and then a large fish, most probably a halibut, would decamp with the tin-bait; but it did not take long to replace it, and the fishing went on as before.

Presently the boats were lowered, and the men rowed

closer to land and fished there. Meanwhile the captain and I rowed to a bird-cliff between us and the coast to see whether we could find any eggs that were get-at-able.

The cliff, which stuck up out of the sea a good way from the land, was practically perpendicular everywhere. Its sides were white with guano, and it was chiefly inhabited by kittiwakes who were sitting on the ledges along its rocky ramparts or hovering near. At the very top sat a burgomaster who looked extremely dignified and unwilling to move from his place. But a rifle bullet which hit the rock just below its feet induced it to rise a short way into the air. It soared in one or two majestic circles high above the vulgar crowd and all living creatures, then folded its wings again and sat down on the same spot, quite in the manner of an official of the good old school.

There were no kittiwakes' eggs, and it was probably still too early in the spring; but now and then a guillemot would fly hastily out of one of the holes in the rock, where it doubtless had its eggs.

A large number of dovkie (black guillemots) had assembled at the foot of the cliff; these birds probably lived somewhere or other higher up on its sides. There were a few cormorants as well.

When we had seen as much as we wanted of the bird-cliff we rowed towards the shore to look for a place where we could land, but this was not an easy matter on account of the dangerous surf. In the end we noticed a large cave hollowed out by the sea in the sheer lava-wall and this provided a safe place in which

to berth the boat. After drawing it well up on to the beach there we set off in search of further adventures on land in the direction of a hut that we had caught sight of there.

I cannot say that the land was very inviting; it was certainly no smiling spring landscape that met our eyes. Nothing but black lava fields lay on every hand; and yet it was a pleasant change to be on land again; and the sun was shining warmly even though its efforts to awaken these dead fields to life might be expended in vain.

We walked up to the hut, and were received there by a friendly Iclander who could talk Danish. He was the keeper of the lighthouse situated a little farther out on Reykjanes. His hut, though small and low, was nicely kept; round about it there was a suggestion of green turf, and there was even a fenced-in patch of ground where he grew potatoes.

While we stood talking, two golden plovers alighted on a hillock near by. I shot them, but found that they were greatly emaciated, and the Iclander said that numbers of them had died that year on account of the cold.

The hut was rather high up, so we had a wide view over the surrounding country. It was all equally barren and bleak in every direction as far as we could see.

Away on the plain we saw the ground smoking and steaming as it does from a big bonfire at home. Here, we learned, there were hot springs, and of course we had to go and have a look at them. I was only wear-

ing slippers on my feet, as I had not expected to land, but that could not be helped. And although the lava made very rough walking, strange to say these pliable slippers did not wear through.

In the vicinity of the hot springs the ground was curiously variegated in color. In some places it was yellow with the sulphur that was present in the soft mud, in others it was white with pumice stone, in others red with burnt lava, or black with ordinary black lava, or blue with a clayey sort of mud.

Wherever there was no lava the ground was quite soft and often hollow underneath, so one had to be careful where one stepped for fear of sinking deep in it or even going right through in some places.

The vapor ascended through a number of openings, often with a choking, sulphureous odor. The main spring was a large hole full of boiling water which bubbled all the time like a simmering kettle. It smelt strongly of sulphur and the water looked thick and oily. The ground near it was blue and soft like clay, often with bright patches of yellow, and it was quite warm.

The sailors, who came with us, collected all kinds of curious-looking stones, including a good many pieces of pumice-stone. Then we wended our way back. Here and there grew a dwarfed juniper bush or a tuft of ling, but there was little grass, only a few sparse blades, which somehow furnished sustenance for the small number of sheep that grazed there. These sheep were exceptionally large and still had their winter wool, which they are allowed to keep until it becomes loose, when it is torn off. Sheep are not shorn in Iceland.

The Iclander told us that the fox (i.e. the mountain fox, or Arctic fox, *Canislagopus*) was a dangerous enemy of the sheep; it killed many lambs and would even take a full grown sheep. Another nuisance was the raven, which often killed the youngest lambs.

He also told us a good deal about Iceland and his own life. He did not keep sheep, as that would mean buying hay in the wintertime; but he had a horse. He could not use a boat there on account of the surf; and there was no port either. But he kept a boat at a port lying some fifteen miles away near Reykjavik, where he also had two men, who were at present engaged in fishing. He himself received 1200 kroner a year to look after the lighthouse.

He thought it very bare and deserted here, especially in winter, for there were no other folk for miles around. As a rule there was not much snow in winter, so one could not make use of ski. In fact the horse is the only means of transport in Iceland, summer and winter alike; but ski can be used in the country farther to the north.

When we returned to the hut he insisted on our coming in and having a cup of coffee. It was a cosy little room, and we were received by a pretty, pleasant-spoken woman wearing the usual Icelandic women's headdress, a cap with a long tassel on one side, not unlike the caps worn by Norwegian university students. We enjoyed our coffee and a chat, and then took leave of our hospitable and friendly hosts.

We could not help thinking it a pity that Iceland was no longer Norwegian. For these folk are our kins-

men, their country was discovered and colonized by our forefathers, and this ancient saga-island is bound up with an imperishable chapter in our history.

When we came aboard again the flag summoned back the boats and they returned with quantities of fish: cod, coal-fish, halibut—one halibut weighing 72 kilos—rose-fish and torsk.

Great was the frying, boiling and eating—and sometimes over-eating—of fish for several days after that. In addition to their ordinary daily rations for each meal the men in the forecastle used also to cook extra dishes for themselves, and all sorts of things were being fried all day long in the galley. There was now an ample larder of fish to draw upon, but it decreased uncommonly quickly too.

We set sail westward, and Reykjanes soon sank beneath the ocean. But the snow-clad volcanic cone of Snafells-Jökull rose high above the sea in the north.

Next day, *May 27th* (obs. $64^{\circ} 57'$ N. Lat., obs. 25° W. Long., 41° , wind E to NE.), we fell in with the "Albert," which was heading for the south-east under full sail and going south of Iceland, evidently bound for Norway. Everybody on board our ship was busy trying to guess why she was returning to Norway just now. After securing her 14,000 young seals at the breeding-grounds she had perhaps been for a trip round by Denmark Strait to get some bladdernoses, and being full up was now returning home to Norway. She was so low in the water that she must be chock full and quite unable to carry any more cargo. Lucky dogs—her crew were sure of valuable "sixteenths," while

we were still empty. Well, we should have to see that we did all the better when we got among those bladder-noses away in the west, and after all Krefting knew a thing or two about catching bladdernoses.

Snafells-Jökull remained visible for a long time above the sea. It was a fine big mountain, but in the end it, too, became smaller and smaller in the distance. That was where the boat that Krefting had lost a few years previously in the ice finally reached land; the men had steered by it as a sea-mark.

Late in the day—it was the eve of Whitsunday—we came at last to the ice in Denmark Strait.

Here we found that several vessels had arrived before us. Among these was the “Nordlys,” which was lying stationary outside the ice and appeared to be in



Snafells-Jökull.

difficulties. As we drew nearer we saw the water from the pumps pouring down her sides; evidently she was leaking badly.

When we came within hail her captain, who was

standing aft, shouted to us that "she'd been nipped in the ice and was so seasick¹ now that they were hard put to it to keep her afloat by pumping."

Krefting did not say much in reply, thinking the ship might just as well go to Iceland if she was in that condition; it was barely sixty-five miles away, and we could see the sheen of the snow on the land at Staalberg Huk. He preferred not to be mixed up with the affair at all, so we sailed on.

These Arctic Sea vessels and their cargo of seals are only insured against total loss. Now if you return home with a leaking old boat like that, which is hardly worth repairing and has caught nothing, it means losing everything. But if you lose your ship and yet pocket the full amount of insurance money both for the vessel and the catch she might have obtained, why, that is simply good business!

As we had expected, the crew of the "Nordlys" abandoned her a few days later, and were taken on board by some of the other sealers.

After this we cruised to and fro along the margin of the ice in Denmark Strait looking for the bladder-nose seals. Around these all our hopes were now centred.

¹This means that the ship leaked more when she rolled and tossed in the sea, and is considered a bad sign.

X

THE BLADDERNOSE

(*Crystophora Cristata*)

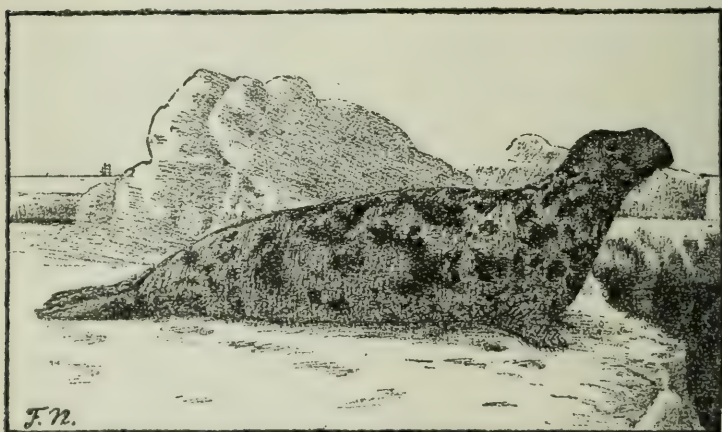
THE bladdernose or hooded seal is next to the bearded seal the largest of northern seals. The male may measure over 8 feet from nose to tail, and the adult female 6 to nearly 6½ feet. One large female that I measured was 6 feet 1½ inches from nose to tail, and 7 feet from nose to the end of its hind flippers.

The bladdernose differs considerably as to structure from the other species of northern seal, and belongs to a special family. One striking characteristic is that the nasal region of the comparatively broad head is markedly developed in breadth, and the snout is covered by a loose, elastic skin, which in the adult male can be inflated into a large hood, and forms a cushion over the entire nose and face.

The sole near relative of the bladdernose is the sea-elephant, which lives in the Pacific and the South Sea and which is still larger.

The full-grown male bladdernose is ashen grey in color, with large and small dark brownish-black spots scattered over its body. The color may be lighter or

darker in various males, and sometimes the back appears to be entirely dark on account of the spots touching each other. The hood is covered with short, thick hair right down to the point of the nose and gives the impression of being dark in color. As a rule it lies loosely, and hangs over the snout like a short trunk. The nostrils open in the anterior part of the hood.



A full grown male Bladdernose.

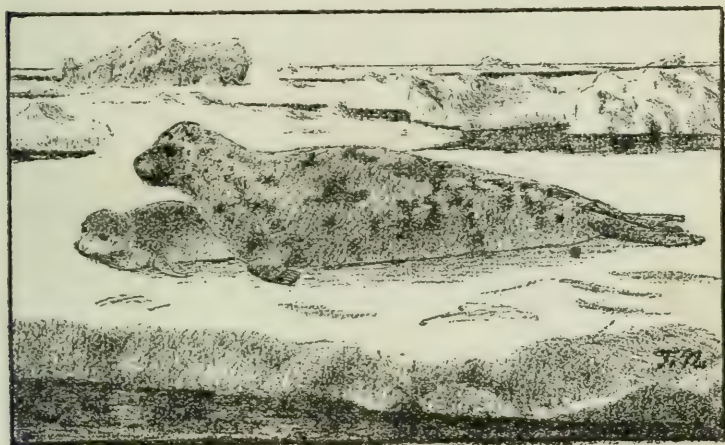
The latter can be inflated to a height of at least $7\frac{3}{4}$ inches, and is about 12 inches long from the muzzle to a point behind the eyes.

The full-grown female is of about the same color as the male, the principal color often being rather light. The skin over the nose is loose, but cannot be inflated. In both male and female the anterior, facial part of the head is so dark that at a distance the head appears to be black.

The bladdernose only gives birth to one young one

a year. At birth the latter may be about 35 inches long. Two young ones, (male and female) that I measured on April 10th, and which still had the navel string out, were 43 inches and 44 inches long respectively, and a male calf which I measured as late as July 8th (1888) was only 46 inches long from nose to tail (53½ inches from snout to end of hind flippers).

The young ones do not come into the world with a soft coat of wool like other young seals, but have a coat of smoothy body hair.



A Bladdernose Seal and its young.

The color of the young ones is grey above, and without spots. The under-side and upper jaw are a light whitish color, the front and hind flippers darker. At the first moult, when the seal is one year old, small dark spots begin to appear, mostly on the back. The upper part of its head becomes a dark, blackish color and remains so throughout the animal's life.

At each moult the dark spots develop more and more,

and possibly at the age of four years the full-grown coat is ready. The male's hood is also complete.

The young ones are born on the ice, mostly at the end of March and in the early part of April; but new-born young ones have been found as early as March 14th (Quennerstedt 1868) and as late as the first week of May (Wollebæk 1907).

Like the saddleback, the bladdernose repairs to comparatively thin, snow-covered ice on which to give birth to its young ones, but often goes farther out towards the margin of the ice, and prefers somewhat thicker floes than those chosen by the saddleback.

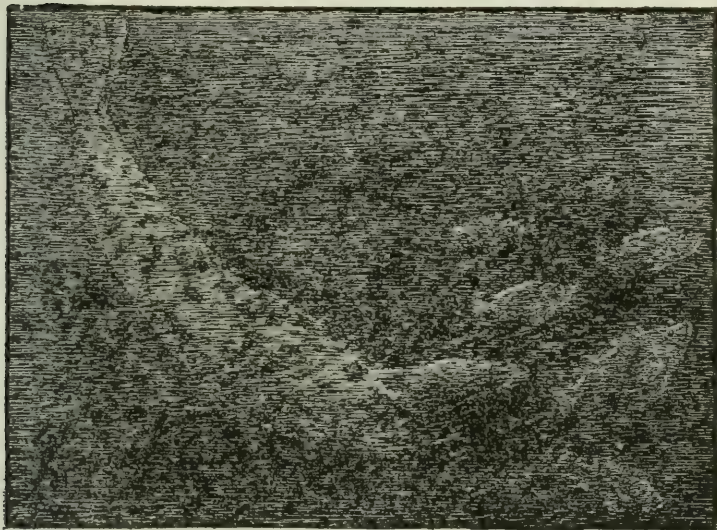
The young seal can enter the water soon after it is born, but is suckled by its mother for two or three weeks. After that time it has to support itself, and its food during the first period probably consists mostly of crustaceans, as is the case with the young saddleback. But it soon begins to catch cuttle fish and fish like adult seals.

The bladdernose is an even more markedly marine seal than the saddleback. Throughout its life it lives for the most part on the drift-ice, and seldom approaches the coast.

It is commonly found upon the open drift-ice, from the sea off Newfoundland and Labrador in the west, to the sea near Spitzbergen and Bear Island in the east. It is also met with on the ice to the east of the latter, as far as 30° E. (in Lat. 76° N.), but is rarely found farther east in Barents Sea. It comes occasionally to the outer skerries along the north coast of Norway, but it has not been definitely observed off the north

coast of Russia and in the White Sea, nor at Nova Zembla.

The bladdernose does not usually go far north in the drift-ice. It is rarely seen in Baffin Bay and off the north-west coast of Greenland north of Disco Island, but it is caught in large numbers in the sea off the south



A Bladdernose catching rose-fish.

coast of Greenland. Neither is it often seen off the west coast of Spitzbergen, north of 77° N., and has scarcely ever been observed to the north of Spitzbergen.

This species of seal is far less widely distributed, therefore, than the saddleback. Neither is it as sociable as the latter, usually lying singly or some few in the vicinity of each other. It is remarkable that in spite of this lack of sociability, and although these

seals never appear in the sea swimming in large, dense herds, yet as will be related subsequently, they may congregate in large numbers at particular places in the drift-ice at certain times of the year. Even then they do not lie close together like the saddleback, but at the most a few on each floe; but they extend very widely, often over enormous areas.

One might think that it is a matter of chance that so many lie near each other in these particular districts, but doubtless they must be regarded as migratory companions that in a certain way belong to each other, for in the regions between the various districts where large numbers of bladdernoses have gone up on the ice, e.g. during their moult in Denmark Strait, there are as a rule very few adult bladdernoses to be found scattered singly over the ice.

I cannot venture to say how they reach these districts, or where they congregate in that vast region, whether more or less singly, or swimming in large, scattered herds; but at any rate they all arrive very much at the same time, and it would appear that they also migrate in the sea in large, scattered companies, but never close together.

They may have a special, individualistic form of social feeling, reminding us of the saying in Haava-maal, "Sit near your friend, but don't sit on his knee."

The bladdernose lives mainly on fish. As mentioned previously, the stomach of a male that I found in the middle of the sea between Jan Mayen and Spitzbergen was quite full of rose-fish (*Sebastes*) and it is probable that even here, out in the deep sea, it lives to a great

extent on deep-water fish. It also often eats the various kinds of cod, and torsk, halibut etc. Its stomach is often quite full of cuttle-fish, of which great quantities may be found in those parts of the sea.



Bladdernose with hood inflated.

It is evident that it has to go to very considerable depths in order to find both fish and cuttle-fish.

The bladdernose is a powerful swimmer and good diver. Its large eyes, the pupils of which can be greatly dilated, are no doubt specially adapted for seeing

in the depths, where there is extremely little light. Perhaps it is also conceivable that the markedly developed nasal region indicates a sharpened sense of smell, which assists the animal in finding its prey in the water when the light fails.

Several writers have maintained that the hood mainly serves as a reservoir of air during diving. This sounds plausible, but in that case it is strange that the hood is only developed in the adult male. Surely the female and young males would need it just as much in the deep sea.

The volume of air that the hood can contain is obviously small compared with that in the large lungs of the animal, though it must be admitted that the former would be of some help. When the hood is compressed owing to the great pressure in deep water, the air would be forced into the lungs, the inner pressure of the latter be increased, and this would help a little against the enormous outer pressure, which at a depth of 100 meters is about 10 atmospheres.

But as the hood is only fully developed in the full-grown male, it is doubtless more probable that it was originally a sexual character, somewhat similar to the antlers of the stag and the great horn of the narwhal. It may either have been a kind of adornment, even though it may be difficult for us to understand the charm of such an inflation,—or it may have served as a protection for nose and head when the males were fighting for the females. When angry or defending itself or attacking, the bladdernose usually inflates its hood.

This of course is no reason why the male when it dives should not also take advantage of the hood in order to increase the supply of air.

It is true that I have seen large numbers of males dive without inflating their hood, but it is probably only when they are going down to great depths for food that the inflation of the hood is needed.

The bladdernose is such a powerful swimmer that it can jump out of the water right on a high floe or hummock. Sealers say that it can jump more than two meters above the surface of the water, but I myself have not seen it jump quite so high.

When on one occasion a boat was lying near the edge of a high floe upon which lay a female bladdernose that had just been shot, a male shot up out of the sea on the outer side of the boat, jumped over this, and the heads of the men and landed on the ice by the side of the dead female.

Out of the breeding season the full-grown bladdernoses usually resort to heavy ice, and as a rule lie on the highest part of the thick floes. The males in particular are often seen on the top of the hummocks.

The young ones, on the other hand, usually seek thinner ice that is easier to mount, and they may even lie on blue "bay-ice."

As a rule both young and old bladdernoses lie near the edge of the floes from which they can easily dive into the sea, and they are rarely seen in the centre of large floes.

They do not as a rule have breathing holes in the ice, but keep to the open channels. When the floes con-

solidate or become too compact, they leave in order to find more open ice. It is asserted, nevertheless, that they make breathing holes when necessary.

The male bladdernose is a powerful and courageous animal, which will often defend itself, at which times it is not to be trifled with, especially when it is in the water. The Eskimo have a great respect for it, as it not infrequently will attack a kayak when it has been harpooned. I know from my own experience that it may attack.

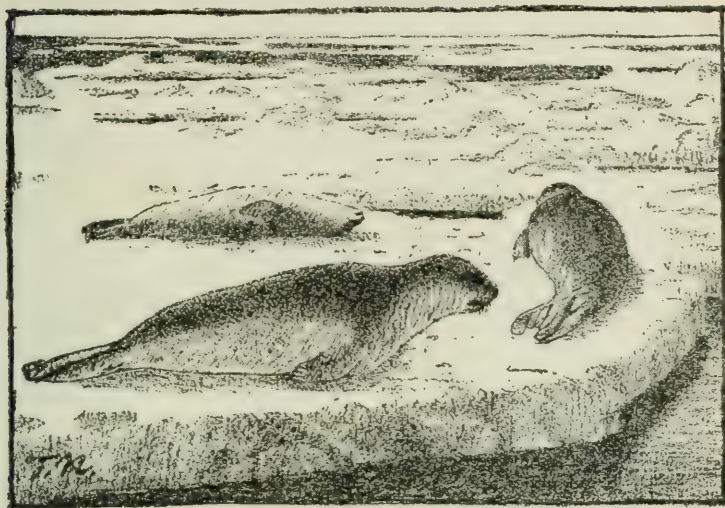
The skin of the bladdernose is more porous and less tough and strong than that of the saddleback or the bearded seal. On this account the Eskimo find it less serviceable for covering their kayaks and woman boats. It lets the water in too readily. The skin of old animals is the worst, that of young ones being somewhat better. Neither is it strong enough for straps and harpoon-lines. For these the skin of the bearded seal or of the young walrus is usually employed.

Each year the bladdernose makes long migrations, but little is known concerning the direction of these.

As mentioned before, it repairs to the outer edge of the drift-ice early in spring in order to give birth to its young, and it does not then choose the old, thick ice upon which it usually lies later on in spring and summer. The reason for this may be that it is easier for the young ones to enter the water from thinner ice.

The males accompany the females to the breeding ground, most probably for the sake of mating, but they are often seen together even before the young ones are born.

As far as is known, there are no definite places in the drift-ice where large numbers of bladdernoses regularly assemble each year during the breeding season. They mainly appear to lie somewhat scattered along the edge of the ice. In the Jan Mayen sea for instance, sealers, when they enter the ice in March and April, may find



Young Bladdernose Seals.

families of bladdernoses with young ones here and there on floes, from 75° N. and south westward to 69° or 68° N., south west of Jan Mayen.

But sealers believe that there are usually families of bladdernoses on the ice outside the great breeding grounds of the saddleback, to the north, east and south of the latter, and when they encounter families of bladdernoses they therefore usually take it as a sign that the "Young Seals" are in the neighborhood, farther in on the ice. The bladdernose does not associate with

the saddleback, and is not seen in the breeding grounds of the latter.

The bladdernose may lie singly on the floes, but it is very usual to find whole families, males, females and young ones together. There are frequently a number of such families in the vicinity of one another.

Sometimes large numbers are found gathered together on the ice during the breeding season, often at a great distance from the saddleback's breeding grounds. For instance from March 27th to 30th, 1873, the sealing steamer "Hekla," (Captain A. Markussen) found a "bladdernose breeding ground" and caught over 300 full-grown bladdernoses and 200 young ones at about $72\frac{1}{2}^{\circ}$ N. and $2\frac{1}{2}^{\circ}$ W. The great breeding grounds of the saddleback were found on April 1st farther to the north-east, between 73° and $73\frac{1}{2}^{\circ}$ N. and about 0° to $3^{\circ} 22'$ E.

In March 1894, quite large numbers of bladdernoses were seen on the ice north and east of the breeding ground of the saddleback.

Before the commencement of the hunting on April 3rd, 1900, the "Hekla" steamed through herds of bladdernoses "as large as a good-sized breeding ground." (Ette, 1901).

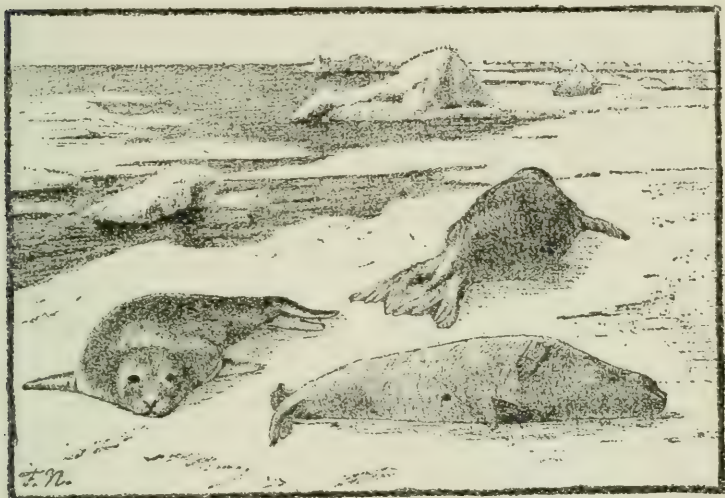
On March 22nd, 1902, the sealing vessel "Belgica" sighted "large numbers of bladdernoses and young ones" on the ice north-east of Jan Mayen in $71^{\circ} 48'$ N. and 5° W. while the breeding grounds that year were found far to the south-west of Jan Mayen, in 69° to $69\frac{1}{2}^{\circ}$ N. and $11\frac{1}{2}^{\circ}$ to 12° W.

On April 18th, 1903, the sealing yawl "Anna"

sighted "a lot of bladdernoses" in the ice in $71^{\circ} 25' \text{ N.}$ and 5° W.

There may often be wide intervals between the places where the families of bladdernoses stay in March and April, and long distances may be traversed through the ice without seeing any, until a district is once more reached where there are a few here and there.

In the drift ice on the outside of the great breeding



Young Bladdernose, two or three months old.

grounds of the saddlebacks off Newfoundland, and especially north of it towards Labrador, large numbers of bladdernoses appear in spring. They also give birth to their young at the end of March and in April at about the same time as the bladdernoses in the Jan Mayen sea, and two or three weeks later than the saddlebacks off Newfoundland. As the numbers of bladdernoses which have been observed during the breeding season at the above-mentioned places

would not be large enough to be in any way comparable with the quantities that exist in the Arctic Ocean, and which, for instance, gather in June on the ice in Denmark Strait, it is evident that the main body of bladdernoses seek their breeding grounds in other parts of the drift-ice, where so far they have not been found at that time of the year.

It cannot yet be stated with certainty whether they gather in large numbers during the breeding season, more or less as they do later on when moulting in Denmark Strait, or whether they lie more scattered, as they usually do in those districts where families with young ones have hitherto been found; but it appears to me that the former may to a certain extent be the case.

On the other hand it is not very probable that there would be large breeding grounds of this kind in Denmark Strait itself, where there are such large numbers in June, for there would not be a great deal of the young winter ice that the seal seeks when about to give birth to its young. It also appears that there are few bladdernoses in that district in April and the beginning of May, and it is not until the beginning of June that large numbers of them congregate.

During the breeding season the bladdernoses usually live together in pairs. The male remains near the female during the birth, and as long as the young ones are being suckled he is prepared to defend her.

In a somewhat early account we read:—"If the female is killed first, the male attacks the hunter or

hunters, and there are instances of its being able to sustain a battle with 5 or 6 hunters for over one hour."

I cannot speak from experience in this matter, since with modern rifles it is easy to make an end of such an animal, even if it has inflated its hood.

Mating takes place after the young ones are born, probably not more than two or three weeks after, when the period of suckling has ended.

After the mating season the bladdernoses, both old and young, set off on their migrations. They usually appear in the sea off the southern part of the west coast of Greenland in April and May. A great many of them are to be seen on the drift-ice off the south coast of Greenland, particularly in the latter half of May and the early part of June.

From information which I received in Greenland it appears that the Eskimo believe that it then comes from the north, and they call that migration the "southern" migration of the bladdernoses.

It is conceivable that it comes from the drift-ice on the west side of Davis Strait, and it appears to be seen in the sea off the coast at Holstenborg, Sukkertoppen and Godthaab, somewhat earlier than is the case farther south. But in the north there is no drift-ice as a rule, and there it migrates along the fishing banks out at sea. The skilled kayak-hunters at Kangek, off Godthaab, told me that it was necessary to seek the seals many miles out.

They are said to appear off Holstenborg as early as the end of March, but mostly in April, and are seen

until the middle of May. They do not arrive until they have bred (Brummerstedt 1891).

The Eskimo chiefly hunt them in the drift-ice off the south coast, in the Julianehaab district, at the end of May and in June. The annual catch has been from two to three thousand.

In the first part of June the bladdernoses begin to leave those regions, and by June 20th—25th they have usually all disappeared.

It is uncertain where they go, but I am inclined to think that it may be along the outer edge of the drift-ice round Cape Farewell and northward off the east coast of Greenland.

In a similar manner there may also be a migration from the drift-ice in the regions of the sea to the north. Thus in the early part of May (8th to 10th), 1877, minor herds of bladdernoses were seen from the "Hekla" north-east of Iceland, between 68° and $66^{\circ} 40'$ N. and between 12° and 13° W. and it is conceivable that these were migrating towards Denmark Strait.

It is possible that a large number of the bladdernoses seen in Denmark Strait in June and July remain in those parts of the sea for the greater part of the year. Bladdernoses have been found there as early as April, or as early as sealers have reached the hunting grounds in that region.

But simultaneously with the assembly of large numbers in this district in June, many bladdernoses may be found on the drift-ice in Jan Mayen sea, even as far

north as 76° N., and it appears that they also assemble there in large numbers at certain places while moulting.

At the end of the eighties, therefore, a number of Norwegian sealers went to the neighborhood of Jan Mayen at that time.

In 1888 the "Hekla" secured about 2200 bladdernoses to the north-north-west of Jan Mayen, with Beerenberg in sight. The majority were probably taken during the latter part of June. The "Vega" also visited that district at the end of May and the beginning of June, but did not catch very many bladdernoses and returned home as early as June 14th. In the same part of the sea and at the same time of the year the "Hekla" secured 807 bladdernoses in 1889, and 1100 in 1890, whilst the "Capella" caught 900 in 1890 (Wollebæk 1907).

Between June 2nd and 12th, 1889, and June 11th to 18th, 1890, the "Vega" was in the drift-ice north-east of Jan Mayen, but only a few bladdernoses were found. Twenty were caught as far north as $76^{\circ} 36'$ N. and 30° W. in the latter year.

On the sealing yawl "Anna" from Hammerfest there were taken in 1903 two hundred crested seals after June 7th and up to the end of that month between $72\frac{1}{2}^{\circ}$ and $73\frac{1}{2}^{\circ}$ N. and between $3\frac{1}{2}^{\circ}$ and $4\frac{1}{2}^{\circ}$ W. As so many could be caught by such a small ship there must have been a very considerable number of seals on the ice.

During the voyage farther towards Jan Mayen at the beginning of July, the bladdernoses were less num-

erous, and on the return voyage towards the east coast of Greenland they were only caught here and there.

There are many other records made by Arctic navigators showing that in June and July there may be many bladdernoses in various parts of the drift-ice in those northerly regions between 72° and $76\frac{1}{2}^{\circ}$ N. and between 3° and 12° W., varying according to the extent of ice.

Sometimes they are also met with far to the east. Between May 2nd and June 13th, 1904, the Hammerfest sealing yawls "Presto" and "Anna" caught about 50 bladdernoses in the region to the east and north east of Bear Island.

Between July 28th and August 3rd, 1902, a considerable number of bladdernoses were seen on the ice south-west of South Cape and between Spitzbergen and Bear Island, and the Hammerfest sealing yawls "Alken" and "Slivet" caught nearly 80 of them, but that year was a remarkable one, in which the great migration of seals to North Norway commenced.

As mentioned above, bladdernoses have been found at the sealing grounds in Denmark Strait as early as sealers have arrived there.

Thus in 1879, a number of bladdernoses were seen from the "Hekla" as soon as she reached the grounds, viz. April 25th, in $68^{\circ} 43'$ N. and $25^{\circ} 40'$ W. Thirty-six were caught on the following days.

Most of the ships reach the sealing grounds in May, and many of these seals are then usually seen on the ice. But they are still timid and the real hunting does not begin until later on.

During all that time the bladdernose is very fat, and floats fairly well when shot in the neck.

In June the number of bladdernoses greatly increases, and as by degrees the moult commences, they become tamer and are more easily shot. They then usually lie on the ice for many days at a time, and are reluctant to enter the water even in sunshine. They lie enjoying themselves in the sun, scratch and rub themselves, and leave large patches of hair on the floes. There are old and young seals of both sexes.

After the middle of June the majority of the seals that go to those sealing grounds appear to have arrived, and they then keep to that ice until the middle of July, when they again begin to disperse.

During that time the bladdernoses take no food, or in any case little of it, and as a rule their stomachs are found to be empty, and the animals are greatly emaciated. The layer of blubber under the skin may be from $2\frac{1}{2}$ to 3 inches in thickness in May, and a full-grown male will then yield about one barrel of blubber, the value of such an animal is some 70 to 80 Kroner (18 to 20 dollars); but in July they do not yield half so much blubber.

As mentioned above, it is not known whither these multitudes of bladdernoses migrate after the moult, but it is probable that they disperse over the drift ice in the sea both northward and southward.

On July 22nd and 20th, 1888, I saw a considerable number of bladdernoses lying on the drift-ice or swimming in the water off the south-east coast of Greenland, in about 64° N. and 40° E. They may have

been migrating southward from the hunting grounds in Denmark Strait.

They appear at Angmagsalik on the east coast of Greenland in July and they then, according to the Eskimo come from the north; but this species of seal never goes near the coast in any great numbers. They keep farther out near the outer side of the drift-ice where the Eskimo in their kayaks but rarely venture.

After the middle of July, but mostly in August, the bladdernoses again appear in the drift-ice off the south coast of Greenland. They are then very lean. Probably they come migrating along the drift-ice from the east, round Cape Farewell. They are then seen off the south coast, in the Julianehaab district, until the end of August, and the Eskimo again hunt them.

It is not known whither they migrate afterwards. Some of them at least probably go across to the ice on the west side of Davis Strait. Some may perhaps turn round and migrate round Cape Farewell and northward along the south part of the east coast of Greenland, but as there is but little drift-ice along the coast at this season, the migration would presumably be known to the Eskimo at Angmagsalik.

It is undoubtedly a mystery where the vast herds of bladdernoses that are gathered in Denmark Strait during June and the first part of July spend the remainder of the summer. It is a remarkable fact that the numerous sealing ships, and persons who have sailed in the drift-ice all over the Arctic Seas to the north, as well as in the south during July, August and right up to the end of September, never appear to have met

as many of these seals as would be expected if the multitudes were scattered over that area.

The explanation may perhaps be, that most voyagers prefer the most open ice, which is easily navigated, and avoid the heavier ice which the bladdernoses generally seek.

Why these latter go up on to the ice precisely in Denmark Strait during the moult, appears difficult to understand. If it were not for the fact that they eat so little during this period, it might be thought that they went there for the sake of food. From the circumstance that the stomachs of a number of Greenland sharks which we caught were full of fish of various kinds, we may conclude that there is an abundance of fish in the vicinity. The sea there is not very deep, 200 to 300 fathoms, with extensive, somewhat shallow banks on either side, and especially towards Iceland these banks are very rich in fish.

It might be conceivable that the bladdernoses went in search of this fish, especially before and after the moult. Sealing skippers have told me that they have observed bladdernoses in the water on the fishing banks west of Iceland, and they have seen them come up with big halibut and codfish in their mouths, shaking and eating them. One skipper told me that as far down as the south of Iceland he met bladdernoses sleeping in the sea. They stood straight up in the water, looking like cork fenders.

But never to my knowledge have any great number of bladdernoses been seen on these banks, and a great part of the multitude in Denmark Strait do not seem to

arrive in those regions until far into June, and they disperse soon after the moult.

It seems to me to be more probable, that the consistency of the ice and the conditions of the drift cause the bladdernoses to seek the above mentioned area in Denmark Strait.

During the weeks while the moult is in progress, the seals prefer to lie still on the ice. What they need is safe ice that will not easily be broken up and scattered by storm and high sea, and which is not drifting too strongly, but which keeps fairly still so that they are not carried away while they lie up on it.

In that respect the conditions in the part of Denmark Strait where the bladdernoses go up on the ice are perhaps better than in any other area in the southern part of the Arctic Ocean.

The ice consists of large, thick floes and hummocks which are carried southwards by the Polar Current proper, as has been mentioned above, and there is none of the thinner winter ice which we encountered to such a great extent in the sea between Jan Mayen and Spitzbergen.

This heavy ice generally keeps rather close together above the wide bank that stretches far out from the coast of Greenland, and there is no danger of it being carried far out to sea, as there is farther to the north.

Above this bank, where the depth is less than 200 fathoms there is comparatively little movement of the ice, as we learned to our cost when we were beset in it towards the end of June; and as will be mentioned

later, the drift of the ice changes abruptly to another direction in this area, setting in landward. The bladdernoses may, therefore, especially at a little distance from the edge of this ice, remain calmly lying on the floes for days, or even weeks, without having drifted noticeably southward.

Farther out to the south-west, along the edge of the bank, where it falls abruptly to greater depths (see Chapter XVI) there is a stronger current which sweeps the ice away. For this reason the ice-margin, generally speaking, remains along the edge of the bank in this area, and in contrast to the conditions farther north in the Arctic, there are comparatively small variations in its position from one year to another, and indeed also from one month to another. Even as late in the summer as August 3rd we found, in 1900, the ice-margin in $66^{\circ} 42' \text{ N.}$ and $26^{\circ} 45' \text{ W.}$

In this part of Davis Strait, therefore, conditions are favorable for moulting and bladdernoses go up on to the drift-ice a little distance inward from its edge, where the movement of the waves does not affect them, but where the openings between the floes are large enough to allow them to enter the water easily. They do not go as far in as the closely packed ice, and if they are on ice that is closed, they leave it.

It is surely no mere chance that the area where they mostly lie—as far as I have been able to ascertain—extends from about $65\frac{1}{2}^{\circ} \text{ N.}$ and $31\frac{1}{2}^{\circ} \text{ W.}$ to 67° N. and 27° W. or just along the outer part of the aforesaid bank. The majority of seals in most years appear to wish to be in approximately 66° N. and 28° to 3° W.

or exactly where a spit or a corner seems to jut out from the main bank. (See Map of depths Ch. XVI).

South of this area the bank becomes narrower, and the edge turns westward towards the coast of Greenland. In addition the warm "Irminger Current" comes westward from the Iceland banks, and turns to the south-west, pressing the Polar Current with increased speed towards the coast of Greenland. There is thus more movement in the ice, and along the whole east coast of Greenland farther to the south-west the belt of drift-ice is much narrower, drifting with such speed that the bladdernoses, if they were lying on it, would have to go into the water every day and swim northward again in order to keep fairly within the same area.

The natural enemies of the crested seal are the polar bear on the ice and the grampus in the sea. If attacked by the latter they have but small chance of escape, unless there is some ice near which they can mount.

The polar bear tries to stalk them while they are lying on the floes, but an adult bladdernose, especially a large male seal, is an adversary large and brave enough not to be conquered without a fight. As a rule, therefore, the bear prefers the young seals if he has the choice. In the water the adult bladdernose is more than a match for a bear.

But the worst enemy of this species, as of so many others, is without question man—chiefly we Europeans, especially since the hunting has begun in Denmark Strait.

The first—as far as is known—to discover this

hunting field was the well known Arctic skipper, Edvard Johannesen of Tromsö, who during a voyage in the Arctic on the schooner "Nordland" in 1874, reached Denmark Strait at the end of May, and there saw a number of bladdernoses on the ice. He cruised along the edge of the ice until July 11th, when he once more sailed north-eastwards, after making a good catch. But he experienced several misfortunes with his men, lost a boat, had another smashed by a wave, encountered considerable storms and fog, and found the ice too heavy for his little sailing vessel.

In 1876 Svend Foyn, the well known pioneer in the Norwegian sealing and whaling industry, sent his bark-rigged steamer the "Isbjörn" to this hunting area. Great multitudes of seals were seen, and several thousands were caught.

After this there was an end to the peaceful existence of the bladdernoses in this region. Every year more and more Norwegian sealing steamers arrived there in May and June, after finishing the catch of the saddlebacks in the Jan Mayen sea, and large catches of bladdernoses were made. At first there were fourteen or fifteen Norwegian ships engaged in this hunting, all of them steamers, and about the end of the eighties there were even more than twenty, besides several British vessels in some years.

During the first years after 1876, the bladdernoses were very tame and easy to catch. Often it was unnecessary to shoot them; they could be killed with seal-clubs, so that the crews of some vessels did not even

take rifles in the boat, but only seal-clubs, when the seals were tamest during their moult.

Soon, however, they became more timid, and after a few years there were not many bladdernoses that could be killed with a club. They had to be shot, often at long ranges.

Strangely enough, it was not only the adult seals that grew timid; when we went there in 1882, that is to say only 6 years after the hunting in that region had started, the young ones were also so wary, that as a rule it was out of the question to get on the same floe where they were, and they had to be shot at quite long ranges.

It is difficult to conceive how this change in their nature came about, if it really has changed.

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It is conceivable that during the first years the young ones were not over confident, but that the adults were loath to take to the water while moulting, and suspecting no danger calmly stayed on the floes while the boats containing the strange two-legged creatures were drawing near. If the old animals stayed, it goes without saying that the young ones followed their example.

Soon, however, they learned what it all meant, and if a few took to the water, the others, both adults and young ones, would follow.

During the initial period, good catches were made every year, generally several thousand bladdernoses by every vessel, and probably a total annual catch of at least thirty to forty thousand bladdernoses.

After the middle eighties, however, the catch diminished considerably. This was to some extent due to the fact that there were fewer seals to be seen on the ice. The herds probably decreased considerably in numbers after ten years of merciless, predatory hunting. The conditions of the ice, moreover, appear to have been unfavorable to the catch. It remained compact for a considerable time during the season, so that the vessels found some difficulty in entering the ice field and whenever any considerable number of seals was sighted. They invariably lay far in, on more or less unapproachable ice.

Although there were now more sealing vessels, the total catch was less. In 1887 there were more than twenty ships, but their total catch amounted to no more than fifteen thousand bladdernoses, i.e. about 640 to each vessel.

In 1888, when I was there on the "Jason," conditions were about the same.

Thus matters continued for some years, until in 1892, 23 vessels caught 33,500 crested seals, and, in 1893, 18 vessels caught 55,700, or an average of 3000 each.

The good catches continued during the nineties. In 1897, for instance, 13 vessels caught some 34,900 seals or about 2700 each.

After this fewer vessels went sealing. In 1900 five Norwegian ships caught about 25,000 bladdernoses, and some ships had more than 6000 each. In 1902, 18,800 were taken by 6 vessels.

Little by little this form of hunting has practically come to an end. The old vessels disappeared one after another, the price of oil fell, and it did not pay to build new and rather expensive vessels. At present smaller sealing yawls or motor vessels from Aalesund and Northern Norway go after the bladdernoses in Denmark Strait in summer. These vessels may be able to catch some along the edge of the ice on promontories and in bays, but they are usually too small and too weak to penetrate into the heavy ice for the hunting on a large scale.

XI

HUNTING THE BLADDERNOSE

EVERYTHING depended now on our luck in hunting the bladdernose for we had to make up for our failure to find the young seals. Krefting had the reputation of being unusually good at this work.

It is work that exacts a good deal of a man. Not only is sound judgment needed, in deciding where to look for the bladdernose seals; one must also be able to see where it will be easiest to penetrate into the ice, and know how to take the ship through. One must neither be afraid of tackling this heavy ice, nor let oneself become so far entangled in it that the ship gets caught.

Moreover on finding the seals one must be quick at laying a good plan for deploying all the boats in the best way, and directing them by means of signs and signals in navigable water and where the seals are most numerous.

In fact the skipper of a sealing vessel must possess something of the qualities of a general, for his aim is the destruction of the largest possible number of seals, just as a general aims at destroying the maximum number of men.

The first thing is to find the seals, which is not always as easy as the uninitiated might suppose, for they do not lie thick on every floe up here. Very often one may go on for days along the ice and see scarcely a living creature; and the inexperienced may think there are no seals in these waters, but then the prospects may suddenly change again.

I have explained already that the ice one encounters here is quite different from that which the sealers meet with earlier in spring, up north in the Jan Mayen Sea. There it is chiefly thin winter-ice, formed on that sea and broken up into rather small floes, whereas here one encounters old, thick floes and large hummocky ice which has been carried hither by the current from the Polar Sea in the north. These floes may cover a wide area, and are not easy to move.

If the ice is compact, even the most powerful of the sealing vessels are incapable of forcing a way through it; but when the wind is not full on the edge of the ice the floes on the outskirts of the pack have a tendency to drift apart, leaving deep bights, lanes and channels affording sufficient open water for the ships to make their way in.

Whenever the weather is clear the sealing vessels sail or steam incessantly to and fro along the edge of the ice, exploring all the deep bights and lanes as far as they can penetrate, while the long telescope in the crow's nest incessantly searches the ice-fields in every direction and sweeps the whole horizon in the hope of finding seals. The men on deck watch the telescope as it moves round all day long, and they glance up fre-

quently to see whether it has stopped in any particular direction.

Should there be a sufficiently large number of bladdernose seals on the ice to make it worth while to hunt them, they can be seen through the telescope from the crow's nest at a distance of twelve miles, as I have said, and even farther off than that if there is a refraction to lift up the horizon. They resemble little black dots on the white ice, and it is easiest to see the old seals which lie up on the hummocks and tall floes, for these project above the rim of the ice when there is a refraction.

But a look-out is being kept for other ships, almost as much as for the seals themselves. The sight of a ship's rigging sticking up above the rim of the ice, or of smoke far in among the ice, is a pretty sure sign that there is sealing in progress, so one has to go nearer and have a look.

When once a sufficient number of seals has been sighted, and the ice is not too impassable, the next thing is to steer for them by the best and quickest way before any other ships can come and "queer the pitch."

"I'd cheat my own father at cards" is a saying equally applicable to seal-hunting; everyone tries to "do" the others to the best of his ability, and the tricks played are often highly ingenious.

If the other ships outside the ice have not observed the seals it may be good policy to set off at full steam and sail in quite a different direction as though one expected to find something there, and so induce the others to follow. When they are a good distance away, it

is easy to lag behind or turn back as if one meant to have another try; and then, while the others sail on, one can slink back alone to catch the seals.

There is no question of saving coal now, and the stokers urge the fires to the uttermost. The skipper, standing up in the crow's nest, signals again and again with the bell-telegraph for increased speed. "Give her all she can stand!" And if the worst comes to the worst, a grating or two may be hung onto the safety-valves to force up the steam-pressure, and one may be thankful if the valves are not screwed up tight.

The ship forges ahead through the ice, charging the floes and hummocks so violently that she constantly heels over. The shattered ice is churned up with an ear-splitting noise, but it has to yield—there is no giving quarter now.

If two floes are too close together the bow of the ship is driven like a wedge between them, breaking great pieces off their edges at the moment of impact; she sticks completely fast, but the screw is whirling round, and little by little the big, heavy floes glide apart and the vessel slips through.

The same thing goes on mile after mile.

Up in the crow's nest the captain raps out his orders: "Hard aport!" "Steady!" "Hard-a-starbord!" "No lower!" "Steady as you go!" The two helmsmen toil till the sweat drips off them, and turn the wheel first this way, then that, while the ship winds in and out among the floes and cannons against them with a violence that almost throws one off one's feet. The revolv-

ing screw leaves a wake of blue swirling water, over which the ice quickly closes.

Things begin to grow livelier on deck as the men realize that there must be a large number of seals ahead. They get up on to the forecastle to look out over the ice, fetch their skinning-knives to give them a good sharpening, or climb up and rummage in the boats. The gunners take out their rifles and start cleaning them.

Meanwhile the skipper is sitting up in the crow's nest with his eye glued to the telescope, enjoying the sight of all the seals lying closely dotted over the ice ahead, while he lays his plans and chooses the best passage for the ship through the ice.

Presently he shouts down "Turn out for a fall!" A yell goes up from every part of the ship, especially from the men's quarters, where all hands turn out and hurry into their sealing-clothes.

The fire in the galley is stoked-up, and the cook sets to work to prepare a good square meal for the men before they get into the boats.

The gunners stroll aft to the steward, who serves out to them cases of ammunition.

The boat-steerers, who have to see to the provisioning of the boats, also come aft to the steward to get the boats' boxes filled with rye-biscuit and the salt-pork which goes with it, and the kegs filled with beer.

A few hours more and the ship is in among the seals. If there is no fear of other vessels coming on the scene, it is usual to steer a course that will enable the hunting to begin at one end of the seals.

At length the word of command comes from the crow's nest: "A fall!" All hands come swarming up from the men's quarters and quickly man the boats, hanging from the davits on both sides of the ship; the gripes are cast loose, and the bread-boxes, beer-kegs, ammunition cases, rifles, and seal-clubs taken on board. Each boat is provisioned with a box containing rye-biscuit and pork, and a good-sized keg of beer. Seldom have I enjoyed any food so much as those hard rye-biscuits, with a thick slice of pork on them, washed down by a drink of beer from the keg, after spending a day or two toiling hard in the ice out there in the Arctic.

Finally the gunner in each boat is told which direction his boat is to row in, the order is given to lower away, and the boats deploy among the ice to begin killing the seals.

On *Whit Sunday* and *Whit Monday, May 28th* and *29th*, the visibility was very poor, and we cruised about near the edge of the ice against a stiff gale from the north-north-east.

It was raw, cold weather up here by the ice with the temperature at about freezing-point. This was scarcely what one would expect at the end of May, but the water was remarkably warm as soon as we got a little distance out from the ice. At four o'clock in the afternoon of Sunday its temperature was 42.4° .

On *Tuesday, May 30th*, the weather cleared up and the wind went down in the course of the afternoon; it became warmer, with a temperature of over $37\frac{1}{2}^{\circ}$.

The long telescope in the crow's nest was all the time

directed towards the ice-field. Was there anything there?

Yes. Later in the evening the telescope was constantly pointed in one particular direction; the rumor went round that seals had actually been sighted, and the ship's course was laid for the interior of the ice.

I was now placed in regular charge of one of the "Viking's" ten sealing-boats as its gunner. Moreover I was given one of the largest boats, with five men besides myself, viz: four rowers and skimmers, and one boat-steerer, Kristian Ballong.

This was indeed showing a great mark of confidence in a young new-comer in the Arctic Sea; I must have stood the test satisfactorily, and certainly I fancied myself more in this, my first appointment in life, than in any that has fallen to my lot since.

Now I had to show what I could do; and I waited with impatience to set off and "win my spurs" at seal-hunting.

By and by we began to see a few isolated seals on the ice, but there did not seem to be many of them.

Then came the word of command: "All hands stand by the boats!" and each gunner received instructions from the crow's nest as to the direction in which he should steer. After that the order was given to "lower away."

We were down on the water in no time and rowed off. But we could not see many seals, and those we saw were very timid.

I have mentioned earlier that the bladdernose seals lie scattered one here and one there, all over the ice.

It is seldom that as many as five or six will lie on the same floe, even if it is a large one. On account of this peculiarity the bladdernose hunting may extend over a very large area of the drift-ice; and as one rows on through it one may easily doubt, until experience has taught the contrary, whether there really is any considerable number of seals there, for the boat is so low down that one cannot see many of the seals at once.

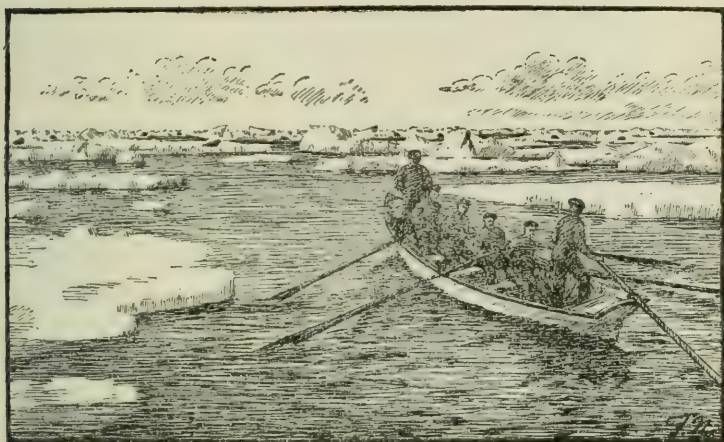
Rowing up to the bladdernose is quite a different matter from approaching the old saddlebacks. In the latter case, as we have seen, one must creep up under cover of hummocks and heaps of ice; whereas in hunting the bladdernose one must row straight towards it in the open fairway and as far as possible approach it from the front, so that the seal may see the boat coming from afar. Care is needed to avoid getting behind any piece of ice which may hide the boat from view, for in that case the seal will immediately go down into the water. If the boat appears suddenly from behind an ice-floe in close proximity to the seal, it will dive into the water in an instant.

But if it can see the boat coming a long distance away, it will raise its head and have a good look, and then, as a rule, lie peacefully down again.

Meanwhile the crew are rowing with a will, and the boat advances at a good rate towards it. Once more the seal raises its head, stares hard at this unfamiliar shape drawing near in a suspicious fashion, then looks down at the water and wriggles uneasily a little nearer to the edge of the ice. Again it gazes at the boat. Then it stretches out its neck—in another moment it

will plunge. But now the gunner gives a sign to the rowers, and they suddenly break into a blood-curdling yell. The seal starts and listens in amazement, while the men row on harder than ever.

It pulls itself together again and wriggles on to the edge. Another yell in a different key, even more long-



Hunting the Bladdernose.

drawn-out and horrible than the first, rends the air. Again the seal stretches out its neck and listens, staring fixedly at the boat as it tears through the water at full speed.

But the seal puts its fore-flippers over the edge, curves its back, and stretches out its neck over the water. Not even the most demoniacal yell will stop it any longer, and if the boat is out of gunshot there is only one resource, and that is for the gunner to shoot at the edge of the ice and send a shower of splinters into the face of the creature. This will cause it to

draw back its head in fresh amazement, wriggle backwards, and stare at the edge of the floe.

Time has been gained for the boat to come within range; with a "Well rowed" the oars are dropped, and hanging in the grummetts are carried close in to the sides by the way on the boat. Everyone must sit perfectly still while the boat-steerer keeps her dead on to the animal and the gunner takes aim. Crack! The seal's head is hit and drops flat upon the ice to move no more.

The bladdernose, like the saddleback, should only be shot in the head, or in the neck to sever the vertebra; it will then drop stone dead and lie quite motionless. On no account should one hit its body, which will make it struggle and plunge into the water and frighten all the seals near into doing the same.

The rule holds good for the bladdernose, even more than for the old saddlebacks, that the first seals must be killed outright if there are many seals lying on the ice near them. Once the hunter has a number of dead seals lying in front of or round him the more distant seals, seeing that those close to the boat are lying so still, themselves quiet down and take little notice of it.

At the outset I had not much luck in my first bladdernose hunt, for I could not get within gunshot of a single seal; they all escaped into the water while we were far away. They were still wary so early in the season.

At length I shot a big old male "hood"; these are usually rather less nervous than the others. We went alongside the floe to skin it. Then it began to move

and I saw that another bullet was wanted; but the cartridge had jammed in the breech, and before I could put in a fresh cartridge the seal slid over the edge into the water. This was extremely annoying.

At this juncture we fell in with the carpenter's boat and raced towards a seal which we saw lying remarkably quiet ahead of us. When we reached it, it turned out to be the carcass of a seal, and a skinned one into the bargain!

Feeling rather flat we rowed on, and in the end we also succeeded in getting within range.

When we were making for the last lot of seals on a floe we had another race against the carpenter's boat; we won, and they had the mortification of seeing us shoot three.

This was the end; a flag was run up to the mizen mast-head to summon us back to the ship.

Our total catch was only eight seals on this first day. Ola Maagerud had done better, having disposed of eleven, and in all 38 bladdernoses had been shot. It was now late in the day on *May 31st*, and by observation we were in $65^{\circ} 45' \text{ N. Lat}$, and $32^{\circ} \text{ W. Long}$.

The "Viking" steamed on now to look for more seals, and steered for the south-west.

On the following afternoon, *Thursday, June 1st*, (obs. $65^{\circ} 48' \text{ N}$. obs. $31^{\circ} 30' \text{ W}$., 31.8° to 33.8° in the air, light wind from NNW) we could not see a way out of the ice anywhere, and as we saw a few scattered bladdernoses round about, the best thing seemed to be to lower the boats of the port watch. They were to take their time wherever they came across any seals.

in order if possible to shoot some of them in the water. Meanwhile the captain went out in a boat to shoot guillemots.

The bladdernose is so fat at this time of year, as previously stated, that it will float for a short while after being shot in the neck. When this happens the boat must row up to it quickly before it sinks and draw it on the ice with a seal-club.

My boat accounted for seven that day. Ola Augundsen killed the same number, and 25 were shot in all.

Next day, *Tuesday, June 2nd*, (33.8° to 35.6° in the air, wind NE) we got out of the ice and fell in with the English sealer "Thetis." Captain Fairweather came aboard, and told us that he had caught 700 bladdernoses. He was the only Englishman we saw on the bladdernose hunting-grounds.

The "Thetis" was a fine-looking ship. She was a good deal larger than the "Viking," with a more powerful engine, and had plenty of coal on board, having come here direct from home, so the captain had no reason to economize and did not care to make much use of her sails.

But she was not so handy for navigating the ice; she was too long and turned too slowly in the zigzag leads between the floes, and was thus more liable to get caught in the ice in spite of the greater power of her engine.

Two years later this vessel was bought by the American Government and sent to the rescue of the ill-fated Greely expedition.

In the ice-field the water was cold, being below 32° ,

but no sooner were we outside the margin of the ice than we found the same warm Atlantic water as before. At 4 p.m. the temperature of the water was 39° and at midnight 43.5° . The air was also colder, viz: $28\frac{1}{2}^{\circ}$ while we were in the ice, but it was $35\frac{1}{2}^{\circ}$ outside.

Next day, *June 3rd* (obs. $65^{\circ} 37' N.$, $30^{\circ} W.$, $35\frac{1}{2}^{\circ}$ to 39° in the air, wind NNE) we sighted more seals, and the "Thetis" had already sailed in among them. We passed by her and then had a "fall".

While we were rowing towards a floe upon which lay seven bladdernoses, we lost the pennant with the boat's number, which is necessary to enable the lookout in the crow's nest to distinguish the different boats through his telescope. We were obliged to back water and pick it up. While we did so Hans the Carpenter's boat got ahead of us and took our seals. This was decidedly annoying; but we rowed on towards another lot instead.

While we were engaged in skinning seals on the ice we saw the sailmaker from the other boat, who was on a floe a little way off, creeping up behind a big male "hood." He leaped upon it, and hitting with all his force buried his club in its head. But the seal made a violent plunge forward, tore the club out of his hands, and dived into the sea with the club still fixed in its head.

The sailmaker remained standing there empty-handed and staring after the seal and his seal-club while we roared with laughter.

A signal from the crow's nest summoned us back to

the ship. While we were rowing towards her, and I was engrossed in finding the best way through the floes, Ballong suddenly shouted: "Hi! look out for yourself!"

I did so, and saw in the water on the port side, not five yards away, the head of a huge male "Hood" forging along straight towards me.

I snatched up my rifle, but I had thick woollen gloves on and in the hurry of the moment let off the shot right in front of the seal's nose. It made a spring, and hurling itself with wide-open jaws on the gunwale bit at me, but caught hold of the sheerstrake instead. I seized a seal-club to hit it with, but it slipped away under the boat and came up on the other side. There I sent a bullet into its head, but it sank before I could catch hold of it with the seal-club, and we were left gazing after its body as it vanished in the depths. Undoubtedly this was a seal which had been wounded—perhaps the very same that the sailmaker had hit on the head.

The "Viking" now penetrated farther into the ice, and we had another "fall."

Our boat was lowered at first in a place where seals were plentiful, and we soon accounted for twenty; after that, however, the ice closed in and we were beset, so the ship had to come and get us out.

We killed 29 seals that day, and our boat was the best. In all the boats shot a couple of hundred seals.

Sunday, June 4th (33.8° moderate wind from ENE.), found us still beset. But a new kind of hunting awaited us now.

When the skins with the blubber still on them are hoisted up by the steam-winch from the boats as they come in, some pieces of flesh and blubber always drop into the water. And when the empty boats are hoisted up under the davits the plugs are taken out of the bottom holes, and all the blood mixed with pieces of flesh and blubber pours out of the boats into the sea, which becomes quite full of it all round the vessel. This refuse may float on the surface of the lanes for several days if the ship is beset.

Numbers of sharks (*Somniosus microcephalus*) had assembled to feast upon all this fine food, and they kept on rising to the surface in the lane round the ship.

These sharks of the Arctic Seas are big, ugly-looking brutes, fourteen, sixteen, or even twenty feet in length; but their liver is valuable, in as much as it yields a large quantity of good train-oil, of which a single large fish may yield more than a barrel.

Why should we not catch some of them? I collected a gang of men and we went out on the ice armed with seal-clubs. Striking these clubs into the heads of the sharks, we dragged them up on the ice; but they were so heavy, that one man alone could not manage, and it usually took several to pull them up.

Afterwards we cut open the bellies of these fish, took out the livers, and stored them in the tanks on board.

There were swarms of them about, and in the course of that day and night we caught about fifty sharks, which means quite a nice sum of money in train-oil.

In the stomach of one of them I found a large ray;

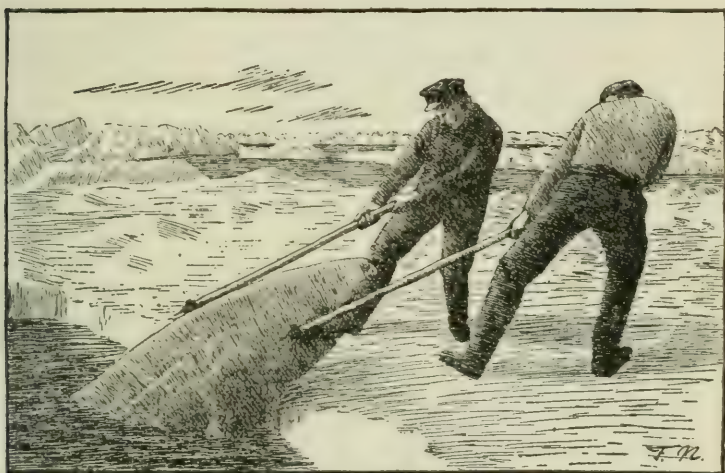
in the stomach of another we found the body of a seal with the skin and blubber still on it, while a third contained a halibut weighing about 52 lbs. and a big codfish.

This shows that here, as elsewhere, there are edible fish in the sea. At the place where we were lying, approximately in $65^{\circ} 21' N.$ and $32^{\circ} 27' W.$, it was something like 300 fathoms down to the bottom; but immediately to the north of this the depth of the sea decreased to about 200 fathoms, and most probably the ray, and possibly the halibut also, had been caught close to the bottom.

The amount that these predatory fish can swallow is well-nigh incredible. On an earlier occasion one of these Greenland sharks was found to contain a seal, eight codfish, a ling considerably over a yard long, the head of a halibut, and several pieces of whale-blubber.

Quennerstedt found in the stomach of a Greenland shark caught on May 21st, 1864, two young saddle-backs, quite entire with their skins intact. One of them still had its white woolly dress. This seems to show that these sharks digest remarkably slowly, for white-coats would hardly be found so late in May, and must have been swallowed a long time before then. It is also strange, as Quennerstedt observes, that the shark had managed to get hold of a "white-coat." Either the latter must have fallen accidentally into the water, or the shark must have pulled it down off the ice. The sealers relate that they have seen these sharks rise out of the water to seize the skinned carcasses of seals lying on the edge of the ice.

In another Greenland shark Quennerstedt found a piece of whale-blubber with the skin on it. This, however, is not unusual, and one can easily imagine how it happens; while the whale lies there motionless and asleep the sharks rise underneath it and bite out lumps of its blubber. Perhaps they catch seals asleep in the water. But how these unwieldy creatures, which swim in such a slow and clumsy fashion, at any rate as a rule, can catch a codfish, seems impossible to under-



Pulling up a Greenland Shark.

stand. I have never seen them put on any speed even when we hooked one of them with a seal-club.

If we stuck the club into the head of a shark, it did not make much fuss, indeed it hardly appeared to notice. And if we had not secured a proper hold we had only to pull the club out again, push the fish round into a better position and strike the club in again in a more convenient spot. Then another man would come

and strike his club in farther down on the shark's body, and the fish was hauled up; it hardly resisted at all, beyond giving a few feeble strokes with its tail, which actually helped us to lift it on to the ice.

But the fact that it is able to catch cod and other fishes seems to prove that at times it can swim faster than we ever saw it do.

The Greenland shark has a huge mouth with an awe-inspiring array of teeth resembling an enormous trap.

One day a boat was rowing back to the ship and towing several large bladdernose-skins in the water because there was no room for them in the overloaded boat. Suddenly the jaws of a shark emerged, yawned over one of the skins, closed again, and cut a large piece clean out of the tough skin and the blubber underneath.

It was strange to see the rapidity with which multitudes of these sharks would congregate round the ship if it lay ice-locked for a few days, both on the present and several later occasions.

They can hardly be directed by the sense of sight, for this does not appear to be over-acute. I noticed more than once that they would swim past the most appetising pieces of blubber without seeing them. It is also strange to notice how frequently large parasites—a species of crustacean¹ (*Laerneid*)—are firmly fixed outside the shark's eye, adhering to the pupil itself.

I incline to the view that they are guided by some kind of sense of smell, which must be very highly developed indeed.

It is also curious to see how tenacious of life these creatures are. I could cut up one of them in pieces, and even then the pieces went on moving. On later occasions I observed that they could be cut up and lie for several days on the ice, and still if one kicked them they showed signs of life.

The flesh of the Greenland shark is perfectly white and looks quite appetising, but is seldom eaten; it is said to be unwholesome, and to contain uric acid. I have not tried it, but I am told that when dried and kept for a time it becomes less uneatable.

In the morning of *June 5th* (32°, moderate wind from NE) I went for a walk on the ice and shot some Greenland gulls ("white-winged gulls") of which there were a good many about. This gull, which is exactly like the blue or glaucous gull (*Larus glaucus*), but slightly smaller, is generally treated as a separate species to which the name *Larus leucopterus* is assigned. I failed to discover that it really constituted a different species, and so far as I could see this smaller form of the bird was merely a variety of *Larus glaucus*. Possibly, however, a very careful study of its anatomical structure might reveal differences which would entitle the smaller bird to retain its specific name. It is quite common on the west coast of Greenland. During this voyage in 1882 I only noticed it in Denmark Strait. I thought I could recognize it at a distance by the fact that it did not fly as slowly, or with the same deliberate swooping movements as the glaucous gull; perhaps, too, it had a less sustained and plaintive flute-note.

While we lay fast in the ice we availed ourselves of this good opportunity to fill the tanks with fresh water.

Drinking-water is not difficult to obtain in the drift-ice during the summer months. The snow and the surface of the ice melt, forming large pools on the floes, and this water has so little salt in it that it tastes quite fresh.

The men line up between one of these pools and the ship, and pass the buckets of water from hand to hand to the water-tank on board.

On *Tuesday, June 6th*, (obs. $65^{\circ} 4' N.$, $30^{\circ} 1' W.$, 32° in the air, moderate wind from NNE), we escaped from the ice, and sailed during that day and the next along the margin of the ice, keeping a sharp look-out for seals but finding none.

Here we again observed that whereas the water in the ice-field was cold (below 32°) among the floes, it became strangely warm as soon as we found ourselves outside the edge of the ice. At 4 p.m. on June 7th the reading was 41.7° , and at 8 p.m. 42.3° on the surface. The air temperature was 32° .

At length on *Thursday, June 8th* (approximately $65^{\circ} 31' N.$, $30^{\circ} W.$, 32° , wind NE.) seals were sighted some distance in on the ice, and our course was directed into the ice-field.

By and by all hands were ordered to turn out for "a fall" and the ship became alive once more.

First of all we passed through a large lane, where we saw seals lying on the ice on both sides of us; but we left these for the ships that came after us, and pur-

sued our way inward to the place where they were most plentiful. Here we had a "fall."

Our boat was lowered first, and I shot eight seals straight away. After that the ice began to close up and we had to row out into more open water.

In all, our boat accounted for eleven seals. Ola Maagerud's and Askjemen's boats were caught in the ice and had to be dragged over it for nearly four miles. There were fourteen skins in Askjemen's boat, so it was heavy to pull. Maagerud's skins had to be taken out of the boat and fetched later.

Altogether the catch that day amounted to 90 seals.

Next day, *June 9th*, (about $65^{\circ} 32'$ N. and obs. $31^{\circ} 36'$ W., 32° in the air, wind NE.) we steered out of the ice again, and fell in with no fewer than three vessels, the "Capella," "Harald," and "Thetis."

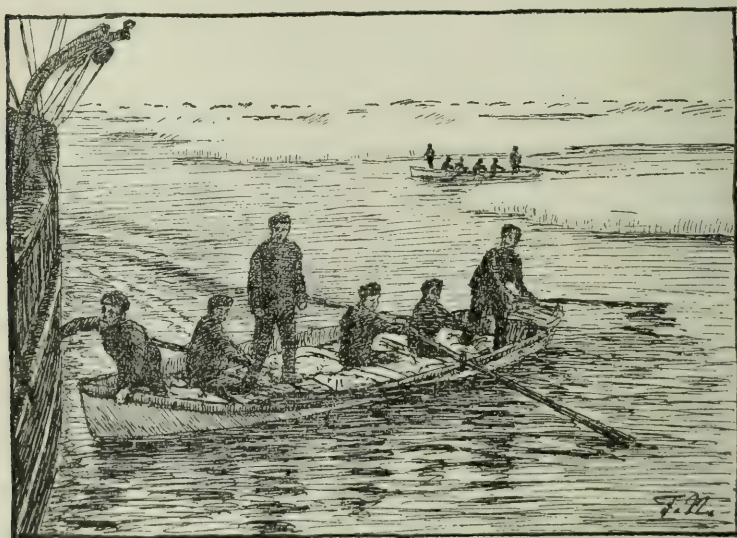
One *Saturday, June 10th* (obs. $65^{\circ} 50'$ N., 29° W., 32° to 39° , wind NE.) we sailed westward again and sighted more seals. The "Thetis" was ahead of us and had passed by without seeing them. But as soon as we turned into the ice the "Thetis" turned too and followed. So did the German "Jan Mayen." We hailed the "Thetis" and agreed that we should set sail in order to deceive the other ships and make them think that we had found no seals.

We pushed on and lowered our boat at midnight. The weather was fine and the sun just showed above the horizon as a fiery red ball. But the bladdernose is wary in the middle of the night.

I wounded several seals, and could not make out

what was the matter until I saw that the sight was crooked.

A little later something went wrong with the hammer of the express-rifle, which would not stand up; so I exchanged it for the reserve rifle which I had with me in the boat. It was only an ordinary rifle for target shooting with a low charge, but I discovered that if anything, it shot more reliably, as it did not kick so much or get hot so soon; it is almost impossible to



Arrival of a loaded boat.

shoot with a heated rifle, for the air quivers over the whole length of the barrel and makes the bead "dance." If the barrel becomes overheated the gunners often plunge it hissing into the sea, but this is not exactly a good way to treat a valuable weapon.

When we had caught 24 seals we found ourselves near the ship, so we decided to put the skins on board

at once and get rid of them. It is better not to have a heavily laden boat in heavy ice.

Then we set out again and killed 15 more seals.

On our return we learned that Johan Lorjen had shot a bear, and I heard to my great disappointment that it had been close to our boat.

Several of the boats had been caught in the ice, but it loosened again, allowing them to return to the ship. Hans the Carpenter had done best this time, having secured 40 skins, while we came next with 39. The bladdernose was still so fat at this season that it did not take many of the full-sized skins to make a boat-load.

At our evening, or rather our night meal, for it was well on into Sunday night, the captain told us that he had been sitting up in the crow's nest watching the Englishmen shooting the seals, and *they* were good shots, if you like! Especially one who passed by in a steam-launch—he was the lad to shoot! They went steaming down a long open lane through the ice, and he picked off the bladdernoses right and left so that rows of them lay dead all the way along both sides.

I soon understood that this was chiefly intended to pull my leg, for when I remarked that in that case it didn't take the man long to fill the boat, and that the Englishmen must have killed more seals than we had, I could not get a satisfactory answer.

However I threw out the suggestion that if he could provide us with a steam-launch we would undertake to dispose of our fair share of seals in quick time too, and

it would be quite good sport to go puffing about at that rate through the ice.

He thought it would be all right to steam about in a boat like that in the fairway, but it wouldn't be so much sport when one got into difficult ice and had to drag such a heavy brute of a thing over the floes.

We soon agreed that when all was said and done it would be a doubtful advantage to use a boat of that kind here among the bladdernoses, where the heavy ice might close up at any moment, making it necessary to pull the boats over the floes, and one wouldn't know what to do with a launch like that. But several of the sealers had tried them.

On *Monday, June 12th*, we steered for the edge of the ice again; it was thick weather with a light southerly wind and drizzling rain, and a temperature of 39° , which is quite summer heat in these latitudes.

In the course of the following day, *June 13th*, (obs. $65^{\circ} 26' N.$, obs. $30^{\circ} 21' W.$) the wind veered round to north-east and north-north-east. The weather cleared up and the temperature sank to 32° again.

The water in these parts was conspicuously dirty-looking, brownish and opaque. This indicated the presence of numerous living organisms in the upper layers of water, such as plants (algæ) and small crustaceans, which filled our nets as soon as we put them out. On the other hand there was hardly a sign of life on the ice.

On *Wednesday, June 14th*, (obs. $65^{\circ} 48' N.$, obs. $28^{\circ} 38' W.$, 32° , light wind from NNE.) the fine weather continued and we went on eastward along the

edge of the ice, but the seals were still conspicuous by their absence.

When there was nothing better to do I was often in the crow's nest with the captain, and we spent many a pleasant hour together up aloft in this little world of our own. One of us could sit on the edge of the crow's nest while the other stood up and looked through the telescope. Sometimes this responsible task was actually entrusted to me. And we chatted incessantly all the time.

One day we were steaming at full speed in open water along the margin of the ice; the weather was beautifully clear and sunny, and we had swept the ice in all directions with the telescope. I was sitting on the edge of the crow's nest, and the captain was standing with his back against the side of it, looking up at me while we talked. The topic must have been an unusually absorbing one, for we had both of us forgotten all about the ship, the ice, and the seals; and we had not even looked ahead for some time.

Suddenly we crashed into something with a violent shock which hurled me off the edge against the captain and down into the crow's nest—fortunately. The mast swayed, and the ship heeled over. The captain sprang to the bell and signalled "stop" to the engine room.

Right out in the open sea we had rammed a big, heavy floe which was drifting there all by itself. The ship ran half-way up on to it, but then one side of the floe went under, and the heavy piece of ice glided slug-

gishly to starboard while the ship slid off, heeled over to port and then lay dead.

The captain laughed, but roared down to the fore-castle man: "Where the devil are your eyes, you blithering idiot, that you can't even keep the ship clear of ice in open sea?"

But the fore-castle man had evidently felt as safe as we had, for he was not on the fore-castle at all.

The crew came swarming up like ants on an ant-hill to see what had happened. Some of them had turned out in nothing but a pair of drawers. They looked over the side, squinted up at the crow's nest, shook their heads and muttered something; then little by little they all disappeared below again. It made us laugh, but the shock of the collision had been terrific down in the men's cabin, and they had all rushed out wondering what on earth had happened.

On *Thursday, June 15th* (31.8°, slight wind from N. and NW.), we again steered westward along the margin of the ice, in company with several other sealers, among them being the "Capella," "Magdalena", "Geysir", and "Haardraade."

Late in the afternoon we saw the "Capella" enter the ice, and guessing that there must be seals there we followed. Whereupon the others did the same.

We passed the "Capella" and the "Magdalena." The ice was loose at first but gradually became denser and of considerable size. The captain was none too pleased, for the "Viking" was more than a little battered now about the bow. All the frozen-up bay-ice that we had gone through day after day in the north had at length

eaten away large holes in the ice-sheathing by the water-line forward on each side behind the heavy bands of iron which are fastened across the stem to protect the bow. These wounds were so deep that splinters of the pine wood planking under the greenheart sheathing stuck out, and only a few inches of pine wood remained intact. It was not exactly pleasant to charge through heavy ice with the bow in this dilapidated condition.

When we passed the "Capella" the two skippers in their respective crow's nests had a talk. They agreed to lie stationary for a while as though they had not made up their minds, hoping in this way to deceive the other vessels which were farther out.

Then we pushed on through the ice with all steam on, and the boats were lowered.

The ice was very difficult but there was no lack of seals. The ship towed us for a bit, and brought us into some good "clumps" of seals. At the first place we came to I shot five, and at the next six seals; after that the ice closed in and the ship signalled to us to return.

On the way back we rowed for a time alongside of Ola Fredrikstad's boat. Then we got into closed ice and had to pull the boat over it; and in the end we arrived first at the ship.

When we came to the last floe under the side of the ship we saw a big shark in the water, and I "hooked" it at once.

Having made short work of that, we were just hoisting the skins on board with the winch when we heard

shouts from the crew of Ola Fredrikstad's boat, as they approached dragging it over the ice. It was something about "a bear."

I picked up my rifle and set off across the floes as fast as my legs would carry me; but got there only just in time to see Ola fire and bring the bear down.

I met Oluf and "Beate" sprinting along at full speed; when they saw me coming with my rifle they stopped, but were so much out of breath that they could not say a word. After a bit they managed to tell me that they had been quite close to the bear, which had been standing quiet, glaring at them, whereupon they had taken to their heels and made for the ship.

I walked on to have a look at the bear, which was the first I had seen dead on the ice. How huge and irresistibly powerful it looked, with those mighty paws and claws! The beautiful white coat had a tinge of silky cream-color against the snow; with one or two red streaks of blood trickling from the bullet-wounds. Its heavy head had fallen very peacefully on one side with its tongue hanging out a little between the fierce rows of teeth. All its labors and joys were at an end.

I followed up its tracks for some distance to see whether it had been alone, and discovered that we had passed close under the hummock it was lying on when we were pulling our boat towards the ship. Peter Holmestranding and Kristian Skröder had gone right past it; and after that it had arisen and smiled sweetly at Oluf and "Beate", who followed.

While I stood there pondering these things, a big male "hood" stuck its head up cautiously through the

ice-sludge and looked at me. I wasted no time in sending a bullet through its neck, and a female who appeared just after had a similar reception.

I called some of the men and we hauled up the two seals, which proved to be fine and large. I shot three more immediately afterwards in the water. This made sixteen to my account that day, and we shot 115 in all.

While we were away hunting the carpenter, aided by several of the hands, had done a good piece of work on board. They had patched up the holes in the bow and had nailed some oak planks over them, so now we could navigate the ice rather more safely.

But the event of the day was the capture of a "troll-seal" ("witch-seal") which the men had brought on board for my benefit. While one or two of them were standing on the ice near the ship this little creature had popped its head up in the lead. With the agility of a cat one of the men sprang towards it across the small pieces of ice, struck his seal-club into its head and drew it up on to the ice. The seal was now presented to me, and I studied it with much interest.

As I have said elsewhere, the sealers regard this "witch-seal" as a distinct species. It turned out to be a small floe-rat (*Phoca hispida*), a species which is quite common along the coast of Greenland, as well as off Spitzbergen and in Barents Sea. Nevertheless there is something mysterious about these little creatures which wander about all by themselves among the floes in the drift-ice, which the floe-rats do not otherwise frequent, either in the Jan Mayen Sea or here in the Denmark Strait. The one we had caught was un-

usually small, being only 25 inches from muzzle to tail; this is scarcely any longer than the new-born pup, which is brought forth early in the spring.

Apparently these "witch-seals" are merely yearlings of the floe-rat, which may become somewhat stunted in their growth during the first few months after their birth owing to their having strayed into the drift-ice, where they could not get sufficient nourishment.

Specimens of such "witch-seals" have subsequently been found in various parts of the Arctic Ocean. I shot one at the end of June, 1895, in about 82° N. Lat., north of Franz Josef's Land. The "witch-seal" is also met with in the entrance to the White Sea, where it is known to the Russians under the name of the *telessai*.

I have seen small and large floe-rats swimming alone in the leads between the ice far north in the Polar Sea.

On the occasion of the great migration of seals to North Norway in 1903 R. Collett states that several of these little "witch-seals" were seen in Porsanger and Varanger fjords, and some of them were not more than 20 inches in length even so late in the year as December.

XII

MORE BLADDERNOSE

THE next day, *Friday, June 16th*, (obs. $66^{\circ} 50'$ N., 30° W., 32° , wind NE.) was drawing to a close. We lay fast in the ice, but towards evening it began to ease somewhat.

The wind was easterly, and we worked our way forward as best we could through the fog under sail; the ice was too closely packed to use the propeller, which might too easily have been knocked off.

We spent the whole day flensing blubber from the skins; for we had now quite a number of skins on board.

There was an appreciable swell coming in through the ice, and it increased considerably as we came farther and farther out. This swell was not exactly pleasant for a vessel between such heavy floes. There was little to be seen on account of the fog.

When we had reached the edge of the open sea, matters became really serious. There was a big sea running, and the large, heavy floes thumped against one another with a dull, ominous sound. The ice-hummocks frequently capsized right alongside of us, and great lumps of ice—"calves"—came shooting up with

a force which, if they had caught us on the right spot, might easily have cracked the ship's side.

A big floe of this kind shot up right under our bow, and the captain and boatswain came down in a hurry from the fo'c'sle; it had looked as if it were going to come tumbling inboard on top of them.

The sea continued to rise more and more with each boat's length that we came nearer the margin of the ice. Ugly looking floes lay all around us.

The position was not without danger. Each time the vessel rose and fell with the sea, she received blows which made her timbers groan, and one felt her tremble in the grasp of this grim power.

For a long time we had a huge floe on either beam and one under the bow. After a thump so hard that we were thrown along the deck, the steward came rushing up. He was preparing the evening meal in the galley, but he no longer felt it to be a safe place to stay in; he had to come and have a look at the captain to find out whether there was any immediate danger, before he dared to go down again.

Every man came up on deck willingly enough now without any rousing. For once in a way it was empty forward in the crew's quarters. There was very little said, and one or two of those who were not used to this kind of rough and tumble with the ice were perhaps a little white about the gills, but all lent a hand eagerly, whenever there was something to be done.

The most important thing was to preserve the boats from "boat-builders" (that is, big hummocks which threaten to sweep the boats away from the davits),

and next to save the rudder. It was useless to try to hold it steady against the blows of the ice. It had to be given free play to lessen the strain on it, and the wheel whirled round like a spinning-wheel, backwards and forwards; the only thing one could do was to try to protect the rudder with cork fenders against the ice.

For the rest we were in the lap of chance. If the ship sank, one would have to do one's best to come safely out on to the ice; and one could only hope that it would not founder too quickly, so that one could at least save some of the boats as well.

Kristian "Balloon" was the same stout fellow he always was; he only laughed, "This is a rare cuddling we're getting," said he, "now she's going to have the dirt scraped off her."

When the fog lifted a little, we saw a ship; it was the "Kap Nord", lying to beyond the edge of the ice, which was only a couple of cables lengths from us. Gullik Jensen would wait there, until he saw how things went with us, and that gave the crew no little comfort.

As for me, having nothing to do, I went right off to bed, and soon forgot the whole hubbub in sleep.

But after a few hours I was awakened by an ice-hummock, which banged against the side of the ship right under my head, so violently that the whole after part of the ship shook, and I felt as though I should be thrown out of my bunk.

Now the engine had got going, and I heard the captain's word of command up above—it was plain that it was urgent to get clear of something or other, possibly

a hummock which was threatening to turn over on top of us or to carry away boats and rigging.

I looked out of the port-hole. There lay a huge hummock by the port quarter; it was not the kind of thing one would want a kiss from, and it was evidently that which had caused the engine to be set going in spite of the danger of having the propeller knocked off.

A little later I noticed that we were beginning to get clear of the ice, the thumps of the floes became less frequent—then they ceased altogether, and we were steaming through open water. The engine was stopped, and we proceeded under sail only.

Next morning, *Saturday, 17th June*, (approx. 66° N., $29^{\circ} 14'$ W., 37° , wind NE.) I was awakened by the captain, who seemed rather surprised to find me undressed and in my berth. They had had a hard night of it, he said, and I was certainly the only man on board who had slept.

I said that as I could not be of any use on deck, I might just as well sleep.

"Well, well," he said, "that is true," but added that only youth and lack of understanding could have failed to realize what might have happened.

I replied that surely things could not have happened so quickly that one could not have put one's clothes on and jumped out on to the ice.

He had to admit that that was probably true.

But it goes quickly enough sometimes. A few years back an English sealer had been nipped by the ice. The captain, who was in the cabin at the time, had only just escaped by climbing out through the sky-light; and

he and his crew had barely gained the ice when the ship sank. But that was an iron vessel, and they crumple up like a tin can when they get among these ice-floes.

At breakfast the captain said:

"I am sure we are going to have a 'fall' today. For you remember, steward, last time we were being cuddled by the ice like this, we sailed straight in among the seal, and took nine hundred!"

Yes, the steward remembered right enough, and what the captain said proved to be correct.

As the afternoon wore on the telescope up in the crow's nest showed a tendency to come back to the same direction in among the ice, while we were sailing before a fresh breeze through some long channels and lanes.

Then the captain sang out from up there that the hands were to sharpen their skinning-knives, and that steam was to be raised.

That made things lively both on deck and in the men's cabin. There were probably quite a lot of seals, but they were some way off yet.

Knives were sharpened and ground, after which came a trip to the fo'c'sle deck to see what the ice looked like for'ard, or whether one could not catch a sight of a seal; then up in the boat to make sure that all was in order there; and whoever passed from the cabin aft, was asked if he knew whether there were many seals.

At last came the word of release from the crow's nest: "Rouse all hands for dinner!"

As usual wild war-whoops sounded from the men's cabin, but today they were worse than ever. One sleepy head after another peered out from the bunks.

Was it already watch-shift? But no sooner had they realized what was afoot, than all were on their feet and getting their clothes on. And now there was an incredible bustle.

In the galley a good meal was prepared, and the men tucked in all they could hold, as it might be some time to the next meal.

Some, who had finished eating, put the last few touches to their skinning-knives with the hone. Everyone had to lend a hand in some way or other; failing anything better they crowded up on the fo'c'sle to look for the seals and get in the way of the fo'c'sle man who was on lookout; whereupon they were chased down again. Then they hung over the bulwarks.

In the meantime the gunners went aft to the steward and got ammunition served out for their respective boats, and the boat-steerers came and got their beer-kegs filled, and were given bread and pork for the boat-boxes. There was much skurrying backwards and forwards over the deck, and if anyone slipped on the greasy skins, and fell flop into the blubber, there were roars of laughter.

We had now been going full speed for some time, and "Kap Nord," which was following us, had fallen behind.

Again three strokes of the bell came from the crow's nest to the engine-room. That meant: "More speed!" And again and again the captain sang out to pass the word to the engine-room "that they were to give us every ounce they could."

At last he called down: "A fall!" and now the lads got a move on with a vengeance.

The only thing left to do was to get the boat-boxes and the beer-kegs, the ammunition-boxes and the rifles into their places in the boats; and for those who had not yet put on their canvas-suit, to do so, or else throw it up into the boat.

"Boats level with the bulwarks," rang out from the crow's nest.

The last boat-lashings were cast off, and the boats lowered down to the bulwarks.

The captain warned the boats to be careful not to become caught in the ice, to keep in the slack ice, and only take the seals which were easy to get at, as there were seals everywhere.

With that the boats were lowered away; each gunner was instructed what course to steer, and they pushed off.

It was a fine sight to see all ten boats set off from the ship at once in different directions.

All were in good spirits and expectant. All rowed hard, trying to be the first to reach the seal; and on the way jokes and chaff passed from boat to boat.

"Hullo! sailmaker, are you going out to kill 'hoods?' Look out that you don't follow after your club yourself next time."

"Mind your own yard-arm, old Balloon, and don't get too tight, or you might ascend!" It must be admitted that "Balloon" was rather fond of the bottle.

A shot rang out. Soon rifles were cracking on all sides. Bullets which had hit the ice went singing past

one's ears—the boys were not too careful where they shot. Everyone's chief thought was to get into the scrap himself.

We were lucky and got twenty bladdernoses right away on one little patch. Then we came out into a long open lane, we rowed and rowed; but no seals were to be found. At last we realized that our course was in the wrong direction, and put about. Through the boat-telescope I kept on scanning the ship's rigging and the crow's nest for a signal indicating the direction we were to row in, but I saw nothing. At length we rejoined the other boats, and found Karl Andersen already nearly loaded up.

Nor did it take us long now to get our boat full; but by the time we got back on board, seven boats had already arrived with a load.

We unloaded our catch; there were thirty-eight skins; then we put off again. By this time it was five o'clock on *Sunday morning, June 18th*.

This time we found plenty of seals; I shot and shot while the boat got fuller and fuller; the great thing now was to make the best of the chance and get as many as ever the boat could carry.

The boat got lower and lower in the water; skins were stacked up right under the thwarts, so that it was pretty uncomfortable for the men who had to row. But still we went on for awhile, for the boat could take a few more yet.

At last it could hold no more; there were only a couple of inches between gunwale and water, and it

was time to return on board; but now the ice was tight all around us, and we were held fast.

We had to wait; to drag the deep-loaded boat over the floes was out of the question. Also it was foggy and one could not see far.

But now we could, at any rate, have a bite to eat—a thing we had not been able to spare time for, so long as we saw any seals on the ice. The “Balloon” was called upon to produce the provision-box and the beer-keg, which were under his care aft. With our skinning-knives we cut ourselves some substantial slices of pork, laid them on the pieces of rye-biscuit and made a rare meal—Jove! how marvellously good it tasted! Our appetites had a keen edge to them by now.

“Now, then! ‘Balloon,’ come along with the beer-keg”—A good drop out of the bung-hole—it was passed round to all; and the “Balloon” began and finished every round. Then came another biscuit with another slice of pork, flavored with the “Balloon’s” humor.

The humor of these lads is unquenchable, when they are of the true brand. However tired they may be, however black the outlook, even if life is at stake, there is ever a twinkle in the eye, and a jesting word that smoothes over everything.

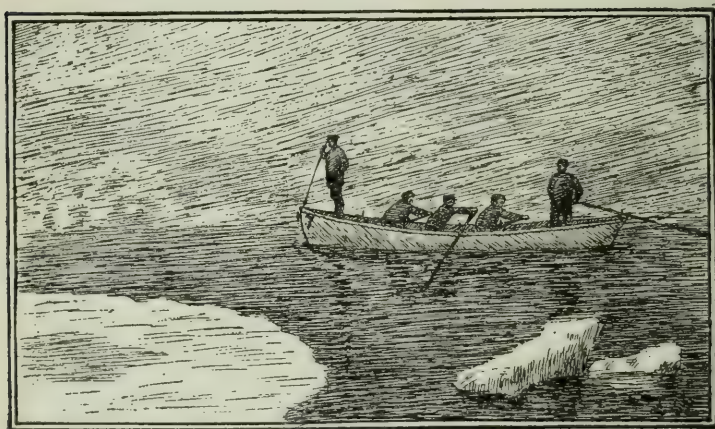
One day while out after seal the “Balloon” fell overboard, and he couldn’t swim. The men all vied with each other to help him out.

“Look here!” said the “Balloon”, “what are you all so excited about? If I am not in a hurry, you needn’t

be either." Then he caught hold of an oar-blade, and pulled himself up again.

At last we had eaten our fill. The "Balloon" took charge of the stores again; but first he had to have a last pull at the beer-cask, and a long one at that.

At length when the night was well advanced the ice eased sufficiently for us to be able to work the heavy boat forward.



Hunting the Bladdernose in the fog.

We met Askjemen, who was out on his third trip, as were, he said, most of the other boats.

My men were tired and sleepy, and were nodding as they pulled at the oars. They brightened up a little when we met Askjemen, but they dozed off again afterwards.

We rowed on through the fog, and came upon other boats. Guttorm Gryte and Hans Halvorsen both had their third load, though they were not so deeply loaded as we were.

We worked our way forward through the ice as best we could, but the fog had now closed right down, and we were not sure where the ship lay.

The fog lifted a little for a moment, and there against the grey curtain around us there loomed up on our beam a big black object, rising tall and dark through the mist; it formed itself into masts and yards, and not many ship's lengths away!

That put life into the lads again; they pulled at the oars, we squeezed our way through between the last of the floes, and at last we reached the ship's side. That was 4 o'clock on *Monday morning, June 19th*.

The steam winch was hard at work now attending to boat after boat. We got our cargo, consisting of 58 skins, hoisted inboard, and a very nice boatload it was for June when the bladdernoses were still so fat.

Altogether our boat had accounted for 96 seals, and was among the best, in spite of the fact that we had been fast in the ice for so long.

We heard that the carpenter had had one side of his boat staved in by the swell that day, and he came on board bringing the wreck of it with him.

There was a goodly pile of skins on deck, and there were still two boats to come, those of Johan Lorjene and Karl Andersen. These two had to spend the night out on the ice, so they unloaded their skins on a secure floe, and man-hauled the boats to the ship. It was late in the day when they came in.

We started off to fetch the skins, but many of the men were sleepy after having been up so long. One of them, Olaves, who was dragging skins alongside me,

tumbled head over heels into the water while he was stepping from one floe to another. But by this time one had become so accustomed to using the seal-club to land the seals that, in my sleepy state, I was just going to strike the spike of the club into him to get him up, when I realized what I was up to, and caught hold of him by the shoulder instead.

It is remarkable that up here in the Arctic one never catches cold, even if one falls into the water and has to go wet on the ice all day. The air is so pure that there are no germs. It is a good thing, for otherwise it might be a serious matter, when one lives in such uncleanly conditions.

What a sight many of the fellows were! They could hardly have washed themselves for several weeks, and their faces, hands, and clothes were bespattered with blood.

During the skinning they stand bent over the seal, and if they cut through its arteries, a jet of blood will often shoot right up into their faces. But it is not washed off; it just dries in and stays there for days, until the incrustations fall off, often taking with them the dirt that lies underneath, so that there are unpleasant pale patches on the black faces, until these again are splashed over with blood.

It is no better with the hands and clothes; there are blotches of blood and blubber everywhere. As a rule, however, they feel little call for a wash, unless perhaps on Sundays and holy days.

Strange to say, in spite of all this there is, as a rule,

little sickness on board these vessels, only gatherings and whitlows, but these may be serious.

If one cuts oneself while skinning the seal, the wound frequently starts to gather. This is hardly to be wondered at with all this blood and oil dirt, and as to washing a wound of this kind and keeping it clean, these fellows never worry their heads about that.

Gatherings of this kind often give trouble. The sealers call it "Arctic swelling," and many are the stiff fingers and stiff joints that it has given rise to.

Krefting used to believe that it came from the seal, and that seems very possible. I often used to see, particularly on the male bladdernose, sores which seemed to be inflamed, with a sort of greenish matter in them. It is, of course, possible that during the skinning the men, if they have a scratch on the skin, may be infected from these seals, and that the gathering therefrom is of a particularly malignant kind.

Certain it is that I have never seen uglier gatherings than up here in the Arctic seas. But it seems that everything is on the grand scale up here, and not merely the degrees of frost, as Krefting put it.

Well, well, this was enough! the men had been up for nearly three days, and now everyone must turn in.

The captain, steward, and I, however, stayed up to catch Greenland sharks; there were enough of them between the floes alongside the vessel.

We pulled them up as quickly as we could, took the liver, and let the carcass lie on the ice.

In the course of the night and the next day, *June 20th*, a couple of hundred of them were caught.

I examined the blood temperature of these great sharks, but could not find much difference between it and the temperature of the water. Yes, there was fish-blood in them, sure enough, and it was little wonder that they were so amazingly torpid.

They would stand up straight in the water just like logs of wood, with their snouts close to the surface of the water right alongside of the ship, and they hardly moved. They resembled the half-submerged logs which stand up on end in our rivers, with the exception that they were of bigger dimensions than the timber in the Norwegian rivers nowadays. It was almost as if they were standing there and awaiting their turn to be hauled up.

Our bow was still in a bad state; the repairing that it got the other day had not been enough. The carpenter had now to take a turn at it again, and with a party of men to help him he managed to get it fixed up with oak-planks sufficiently well, we hoped, to last the rest of the trip.

While we had been making this last fall, the other ships had to remain outside and look on; a belt of thick ice shut them out. The "Kap Nord" had also, strange to say, stopped on the way; perhaps they had been afraid of the difficult ice.

This time we had scored, but now it looked as though we might be caught fast, and that would not be pleasant.

Meanwhile we went on cutting away the flesh and flensing off the blubber from the skins throughout Tuesday and on *Wednesday, June 1st* (obs. $65^{\circ} 50' N.$,

35½°, wind N.). There was a huge pile of skins on the deck, and we had to get rid of as many as possible.

Later on Wednesday, the ice fortunately eased so much that we got free, and we sailed out again to look for more seals.

Early next morning (*June 22nd.*), we were roused out for a fall again, and the boats were lowered among heavy ice, which was fairly hard to work through. But the bladdernoses lay thicker than I had ever yet seen them—it was almost like herds of saddlebacks.

As I could not get the boat through the floes, I walked over the ice and shot; but to my great vexation I had to stop, as a flag was flying from the mizzen mast-head, and we had to return on board. We had only been out a couple of hours, but none the less a hundred seals had been taken, and our boat had 21.

On the deck the carpenter was repairing his boat, which had had the side staved in in the swell on the 19th. I helped him with the puttying, and we were just finished when there was a "Rouse-out" for a fall.

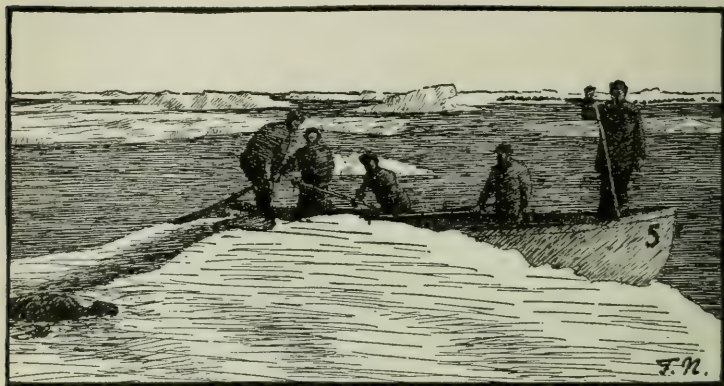
Ola Maagerud and I were lowered. But I had only shot five seals when the flag was hoisted, and we had to return on board again.

And now we had a stiff row for a couple of hours to reach her, while she continually went away from us. The men grumbled and swore at all this unnecessary labor, but at last our turn came round. The ship came back and took us in tow.

We got in among a nice little bunch of seal, and got 22 straight away, which we unloaded, as we were so near the ship.

We put off again, but when the flag was next hoisted we had not yet got a skin.

It was now late in the evening, and the order was passed for every man to turn in as quickly as possible. That looked as though there were more seals in sight.



Loading the boat.

We had not slept long—it was only an hour and a half—before we were again roused out for a fall, and the boats were lowered as soon as ever they were ready.

It was *Midsummer-Eve, June 23rd*, and fine weather. A large number of seals were lying about on all sides, and the only thing needed was to find the stretch of ice where they were lying closest. The cracking and banging of rifles was heard on all sides, and bullets flew whistling past.

We had not proceeded many flocs' lengths, before we had 37 skins. Then the ship passed us; we got rid of what we had, and were sent out in a new direction.

We got several again right away, but then we came to tight ice, and had to wait patiently until the flocs

loosened sufficiently to allow us to slip through. Whole herds of seal were lying up on the ice, if we could only manage to get past the nearest ice-floes.

We saw the others pulling their boats over the ice to reach the spot, and they were well able to do this as they had come straight from the ship with empty boats. Ours was already half-loaded, and my men were of opinion that it was no use trying to drag this heavy boat over such difficult ice; the others would be in front of us just the same.

Well, well, they were of course in the right, and we had to curb our impatience.

But in the meantime we got a cheering-up from watching Olaves from the nearest boat, who was stealing cautiously forward on tip-toe behind one of our dead seals, which we had not yet skinned. He approached it without a sound, step by step, until finally with a tiger-spring he planted the spike of his seal-club right in the skull of this remarkably tame animal.

We roared with laughter, and he retired crestfallen back to his boat again.

We could see now that Ola Augundsen and Gutorm Gryte were beginning to work their boats forward, and we became uncomfortably anxious lest they should forestall us.

But just then the ice opened up in front of us, and we cheated them properly after all. We came in among a "clump" and got a boat load right away. I shot seal after seal on both sides, while the boat was gliding through, and they were now lying there dead in rows.

I was thoroughly in the mood that day, and would

willingly have gone on farther; the seals were plentiful enough; but Kristian "Balloon" protested; his view was that we were not able to handle those that we had shot already, and so I let myself be persuaded to stop.

That was, however, a considerable annoyance to the captain, who was sitting in the crow's nest and watching through the spy-glass. He told me later that he believed that not even the Englishmen could have shot better, and that he only wished that I had proceeded farther and gone on shooting, leaving the other boats to pick up the seals. We skinned as quickly as ever we could, took as many skins as we could manage in our boat, and left the rest of the dead seals for the other boats. We had now 59 skins, but the boat was so loaded down that we had to be careful not to take on board too much water.

When we had discharged on board, we set off again. But now there was not much life left in my lads. The sun was blazing and the ice blazed back, so that one could hardly keep one's eyes open.

If I went off to a hummock to look for seals or for a passage for the boat, the men were asleep by the time I came back.

I was jumping on to a floe in order to push off another floe, which was barring our way, when the boat-hook which I was holding in my hand got caught in the bottom of the boat and tipped me right over backwards on to my head in the water, just as I got one foot on to the floe. I went well under, and had to take to swimming in order to reach the boat again.

The boys who were nodding over their oars awoke

at the sound of the splash, and they started up in a fright when they saw me in the water ; but I told them to stay quiet, as I could manage for myself. I got a hold of the side of the boat with one hand, and the edge of the ice with the other, and lifted myself up. But naturally just as I was going to heave myself up on to the ice, the boat slipped away from me, and I got another ducking.

However, I soon got up again at another place, where the edge of the ice was lower. I had to take off my sea-boots to empty the water out of them, and then my stockings and clothes in order to wring them. Then on again with the wet garments.

I now came to appreciate the value of being clad entirely in wool, for when I got on board well on in the day, the woollen vest next to my skin was dry again, so that the captain only laughed incredulously, when I told him that I had been in the water.

We continued to work our way on through the ice. Then the flag appeared at the mizzen mast-head, and very glad were my lads. But at first it was not of much use to us ; the ice had closed in, and we had to stay where we were, and the men naturally began to nod and doze off. After a while the ice loosened, and at last we got back on board.

On this last trip we only got 15 seals, but in all our boat had secured 111 during that fall, and it had caught more than any other.

Now it was every man to his bunk as quickly as might be. But we were not to have much sleep this time either. In the early morning, *June 24th*, we were

roused out again. The mate came in and told us that he could see two bears among the seals. You may bet that that woke me up. Now for once was there a prospect of having my keenest wish fulfilled. How strong are the hopes of youth, how radiantly bright its joys; and how black also are the shadows of its disappointments!

We got into the boats and were lowered away. Each gunner received instructions from the captain as to the direction in which he was to steer.

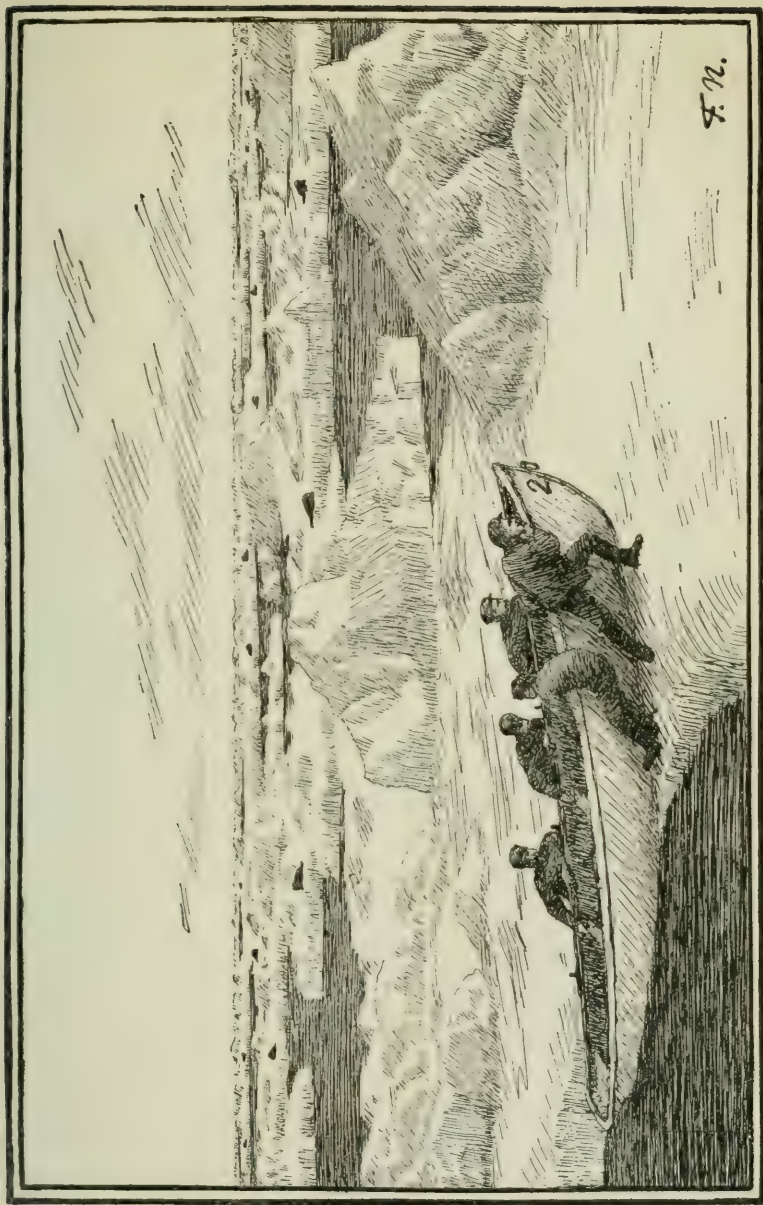
Impatiently I waited, expecting to hear that now it was my turn, and to be told where the bears were. But not one word came about that; I was only told the direction in which I was to row.

There were plenty of seals, but that did not so much interest me today. I was up on all the hummocks that we came near, and looked intently through my glass for bears, but without result.

It was midsummer day, with the sun at its highest. It had been bad here before during the day-time, but now it was worse. From both sun and ice came a brilliant glare, and one only opened one's eyes when absolutely necessary, and then preferably only one at a time.

I longed for my snow-spectacles, but I had lent them to one of the other gunners, whose eyes had been smarting.

One gets as brown as an Indian, and the skin peels off one's nose and cheeks and chin. The mouth gets sore and the eyes smart, but strangely enough we had



F. N.

Putting the boat across the floes in order to get at the Bladdernose.

only one case of snow-blindness. That was Gunner Guttorm Gryte, who was bad for some days.

But how marvellously beautiful it was, even if the bears were not to be found!

When one's thoughts return to those days up there among the Northern ice, it is just such a day that one conjures up.

What wonderful peace! The air shimmers over the white shining floes. There is a pale-blue tint in the cracks and crevices along the edges of the ice, and a greenish tinge along the "tongues" far down into the cool, blue water. One can hear the melted ice-water gurgling in little runnels down the side of a big floe. And far away one can see the glinting lanes.

Here and there a seal is lying and taking its ease, scratching itself a little with its fore-flipper and rolling over on its side. An ivory-gull flies lazily along and perches on a hummock beside a chum.

It continues thus for the whole twenty-four hours—and at night the sun sinks to the rim of the ice, and sets all the Northern heavens on fire.

At length the flag was run up to the mizzen mast-head; I had almost forgotten the bears by the time we came alongside of the ship. But what was that up there on the fo'c'sle? The skins of three bears were spread out there! The captain received me with a laugh as I came aboard up the rope-ladder.

He had sent us after the seals, as he thought that that was more important; then he himself had taken the ship along and shot the bears.

I had got 19 seals that day, but that was no consola-

tion for three bears, and this would probably be my last chance.

In the last three days we had secured 1100 seals in all.

It happened sometimes that among all these bladdersnoses were one or two bearded seals; these prefer to lie singly, or just a few near one another, but never in herds.

They are huge seals, even longer than the bladder-nose, being over nine feet in length, but not so thick-set in shape as the latter.

Their backs are blue-grey, without noticeable markings, and they are lighter on the under-side. They have long whiskers which from a distance look like a fine pair of moustaches; it is on this account that they are also called "*Phoca barbata*," or *Erignathus barbatus*.

We killed a few of these. On the other hand, I did not see a single saddleback in Denmark Strait.

On one of these days we came across the "Thetis" again, and Captain Fairweather came aboard to see us, and got a notable reception. He was full of admiration for the Norwegian sealers.

"Well, now we have been several times near each other while sealing," he said, "but whenever I put my telescope on the 'Viking,' I would see fellows rowing backwards and forwards to and from the ship; and so far as I can make out Norwegians never sleep so long as there are any seals to be had."

"No, of course not," said Krefting, "one has to hang on so long as there are any seals on the ice."

"Yes, but my people," said the Scotsman, "want to

be on board every evening and will have their regular sleep, however many seals there are on the ice."

"Yes, but we Norwegians like to work by fits and starts," Krefting explained. "We can hold on right enough when it is really needed. But then our fellows like to take it out in a spell of laziness later on. Now I have been watching your gunners; they are mighty smart fellows; I remember especially one man in a steam launch. I haven't often seen better shooting."

"Ay," said the Scotsman, "there *are* several of them who are quite good; but I'll no be saying that they are better than the Norwegians. Besides it isn't so much the shooting that matters as being able to get the boat through the ice, and making the men work properly, and there, as I have seen, we cannot compete with the Norwegians."

Perhaps he was in the right there; for the Norwegians are certainly well-trained in boat-work.

Finally he gave it as his opinion that it was no use for Britishers to try to compete with Norwegians in seal-hunting, and for that reason he thought that the former would give up this work in the Arctic.

In Newfoundland it was another matter; there, he said, one took on board several hundred of the half civilized seal-hunters from the shore, who landed on the ice and did all the killing. He and his own men had nothing to do but to work the ship, and collect the piles of skins.

But they were an awful crowd to have on board the ship, he said; they did as they liked, and to argue with them was useless. The best thing the captain could

do was to stay in his cabin. They slept everywhere, in the crews' cabin, in the hold, or on deck, and they never undressed during the whole trip, though they would get covered with blood and blubber. With their great hob-nailed boots they would tramp about everywhere on deck and in the rigging, and the bulwarks and all wood-work on board had to be battened over lest they should be chopped about too badly.

As soon as they sighted the seal, they worked the ship up against the ice, however heavy and close-packed it may be, and began to force their way through. If the captain tried to interfere, thinking that things were going too far, he only met insolence or worse.

But then every man of them would go out on to the ice, and there they knew their job, and would stay away for many days at a time killing the white-coats. They took little food with them, for they ate the heart and kidneys and flesh of the seals raw, if need be, and particularly enjoyed the flippers of the young ones.

The skins were piled up on the ice, and each pile being marked with a flag pole carrying the ship's pennant.

Then one day some of them would come back on board and report that a full ship's load was lying ready in various places on the pack ice. And the next thing was to get there, as soon as the ice eased a little.

But in the meantime a storm would sometimes come, splitting up the ice and raising such a sea that the ships had to keep away, thereby losing the whole catch which lay on the ice.

The Scotsman could not deny that it was a great

relief to get rid of this crowd of pirates, and become one's own master again on board.

Their pay was a third part of the catch, which they divided among themselves.

In the evening of *June 24th* we passed a good many bladdernoses on the ice. But the captain thought that before we took any more seal we ought to take care of the blubber and the skins we already had on board. They were beginning to rot; several of them were already smelling, especially those which were lying on deck near the engine; and the oil was flowing over the deck, although sea-water was constantly poured over the whole pile of skins.

It was a sure sign that the men were feeling tired after so little sleep these last few days, when four of our gunners tried to shoot some seal that we passed from where they stood on the fo'c'sle. We only killed two seals, and many more were missed. Probably our eyes were too tired from the glare of the sun.

The next day was *Sunday, (June 25th)*; but we went on with the blubber-flensing all the same; it would have been more of a shame to let the skins lie and rot than to profane the day of rest.

But in spite of everything we were soon called away again for a fall; there were too many seals on the ice for us to let them lie there.

My boat rowed and rowed, but only found some isolated seals, and we didn't think that that was much to call a fall for. But presently a signal was made to us from the crow's nest to alter our course, and now we found more seals. But we had soon done there too.

Then we saw a flag hoisted beneath the port foreyard arm, which was a signal for our boat to return to the ship.

I thought that perhaps it was a bear; for the captain had given me a solemn promise that next time, if there was any next time, it should be *my* turn. But when we arrived we heard something very different: we had been rowing all the time in an utterly wrong direction! The captain said that, considering me to be one of the best gunners, he had wanted to send me just where the seal lay thickest, instead of which we had rowed off in a perfectly hopeless direction. If we had steered right, we should have had the boat loaded long ago. Hans the carpenter had already come on board with a load, and most of the gunners were on the way with loaded boats, while we had only 26 skins.

There are many changes of fortune and disappointments up in the Arctic seas, but one has to bear them with patience, though one cannot help being a bit upset about them at the time.

We put off again, thoroughly determined to get some of our own back, if that were humanly possible; and we managed it too.

We had not gone far, when a dense fog shut down like a wall, but an occasional signal from the steam-whistle kept us informed where the ship lay, and the seals were in abundance on all sides. They kept on appearing through the fog as we rowed along, and they were shot and skinned without delay.

Fresh ones kept on emerging, either on the same

floe, or on the next. In a fog like this the bladdernose was quite tame.

Now and then we had to get out the boat compass and take our bearings with the aid of the sound of the steam whistle.

If once the fog sets in properly up here, it may last for days, and if one is beyond earshot and does not know the compass bearing of the ship, it may be serious; men have often been lost in the Arctic Ocean in this way.

We heard the whistle go eight times as a signal that all the boats were to return on board.

By this time we had the boat nearly loaded with 43 skins, which placed us among the best that day also.

And now the ice closed in around us, and both that and the fog remained impenetrable for several days. In the meantime the blubber-flensing went on at full speed on board in order to be ready for the next fall, as soon as the ice slackened again.

The captain was glad that he had every man safely on board. As I have said, it is easy to lose them in such an uninterrupted fog, and he had no desire to repeat the experience that he had had some years before when he skippered the "Magdalena".

He had sent the boats to kill seals, and they had spread out over a considerable area, when a dense fog suddenly came on. The signal was given on the steam whistle for the return; and all the boats managed to get back except one. They waited and waited; the steam whistle was sounded, the ship's bell was rung, a can-

non was fired, but to no purpose; the boat did not return.

The ship remained where she was, in order that the boat might find its way back to her.

Every sealing boat has a small boat's compass, and the boat-steerers have orders to take the bearing of the ship immediately the fog begins to shut down, so that they may know in what direction to make for her through the fog.

They waited all that day and the next, and still no boat came.

At last the fog lifted, and the ship moved around through the ice in search of the boat, but in vain. At last they had to leave without having found it; they returned home in the firm belief that disaster had overtaken the men, and came in to Tönsberg with a mourning pennant flying under the peak.

What had happened to the boat was this: When the fog had arrived they were just about to row towards some seals, and the boat-steerer had apparently failed to get a correct bearing of the ship. They were far away among the ice. They had tried to row towards where they thought the ship lay, but they could hear nothing, and the fog continued as thick as ever.

They rowed and rowed, trying various directions, but there was only ice, ice everywhere. The safest thing, therefore, was to make their way out to the edge of the ice, in order to avoid being held fast in it.

They had some skins in the boat, but no food except the ship biscuit, the piece of pork in the boat-box, and the keg of beer; but the latter would not last long.

They had, of course, rifles and cartridges, and they shot some guillemots. But they had no matches, and they tried in vain to ignite some hemp and ropework by shooting into them; had they but succeeded in that, they could have lit a fire on the ice with the boat's bottom-boards and blubber, and cooked the guillemots in the boat's dipper. To eat the birds raw seemed out of the question to decent men of their type.

The day passed, and the night, and the next day wore on; they had reached the edge of the ice, but the fog was as thick as ever.

What were they to do? If they stayed here in the ice, and could not find the ship, it meant starving to death. The nearest human habitations were in Iceland. That could not be so very far away; and there seemed to be nothing for it but to put out to sea eastward in the hope of making the coast.

It was a long pull. Soon after they left the ice, the fog cleared, but there was no land to be seen. They went on rowing, and did not realize that they were being carried southward by the current.

At last some peaks appeared over the horizon to the north-east; it was the Snæfell-Jökull, and glad indeed they were to see it; now it could not be long before they reached land.

They rowed on and on from morning till night, but they seemed to get no nearer to this mountain; when the evening fell it seemed still to be the same height above this endless watery plain.

And now a contrary wind had got up, so that they could make no progress. They began to lose heart.

The last of the biscuit and pork had long since been eaten. Hunger gnawed at their vitals, but the thirst was worse, and the beer was all gone. They could do no more, and they lay down in the boat with a heavy foreboding that they had made their last voyage.

In the early morning one of them awoke. The wind had fallen light, and he saw the glacier somewhat higher above the sea than in the previous evening.

The sight gave him new courage; he roused the other men, and they took to the oars and began rowing with renewed strength.

And now the mountain indeed rose higher and higher, and their courage rose with it. They had got into the north-running current now that they were nearer to Iceland, but this they did not know.

Finally they reached the shore late in the night, but by that time they were utterly exhausted. In due course they reached human dwellings, where they were well received and cared for.

And so they came to Reykjavik, and from there home by steamer. Thus they at last reached Norway, to the great joy of their families and friends, who had long since given them up for lost.

XIII

THE POLAR BEAR

THE Polar Bear is among the most nomadic of all land mammals. The drift-ice is its natural home, and living on this, it is distributed over practically the whole of the Arctic regions. It is found on the drift-ice along the whole east coast of Greenland as far south as Cape Farewell, and occasionally comes ashore on Iceland. It is found on the ice everywhere in the ocean which lies between Greenland and Jan Mayen and Spitsbergen, and in the Barentz sea up to far north of Franz Josef Land, and southward down to the northern coast of Russia. It also occasionally comes ashore in Finmark in the north of Norway. Eastward one finds it all along the north coast of Siberia, and on the ice off this coast, also among the New Siberian Islands and away to the Bering Straits and south again in the Bering Sea; it will sometimes even come southward right down to the northern extremity of Japan. One meets with it along the coast of the Arctic islands north of Canada, on the northwest coast of Greenland, in Smith Sound, and in Baffin Bay and Labrador, and it may come with the drift-ice right down to Newfoundland.

Its journeys across the drifting ice-fields may be of great length, certainly up to many hundreds of miles. It is not found commonly in the innermost regions of the North Polar Sea, as there is not enough food for it there. But I have found tracks of bears north of Lat. 83° N., and on the "Fram" expeditions in 1896 bears were shot in Lat. $84^{\circ} 10'$ N. and Long. 26° E. Apparently it is possible for it to wander at times over the entire Arctic Ocean, right up to the Pole itself.

In appearance it differs from our brown bear not only in its white color, but also in its longer body and neck, its comparatively small head, which with its shorter ears, and its longer and somewhat aquiline nose give it a wilder appearance. It also surpasses our brown bear considerably both in size and strength.

The hinder part of its body is higher than the fore, and this gives it a peculiarly clumsy appearance which in combination with the fact that it ambles makes its movements as it comes striding along over the ice seem extraordinarily slipshod.

Huge and heavy as it is, however, it can be remarkably agile when occasion demands. It can make a spring to seize its prey almost like that of a cat, and it can move over the uneven ice with a speed that is almost incredible. It has surpassing strength and its mighty fore-paws are its usual weapon. One single blow from them may dispose of a seal.

The male bear is larger than the female. Its length is ordinarily between $7\frac{1}{2}$ and $8\frac{1}{4}$ feet from nose to tail; the tail measures up to $8\frac{1}{2}$ inches in length. The length of the full-grown she-bear is on an average

about $6\frac{1}{2}$ feet. A full-sized male may weigh up to some 900 pounds.

Its food is chiefly seal, preferably the young seals. It may also catch small whales, and its usual method in this case is to leap on to them from the edge of the ice or the shore where it lies in wait; on the coast of Siberia I found the blubber and skin of a white-whale calf in the stomach of a bear which had been shot. But it is prepared to seize any of the fauna of the Arctic Ocean, that it may chance on, dead or alive. Thus, on the shores of the lands bordering the Arctic seas, it has been known to eat lemmings, birds and birds' eggs, egg-shells having been found in its stomach. If opportunity offers, the Polar bear will also stalk the reindeer, which it has to steal upon as it does upon the seal. It will also catch fish; on the banks of the rivers in the Arctic countries it will lie in wait for salmon-trout, which pass up these rivers in great quantities. On occasion it will also eat plants. In the stomach of a bear I have even found algae (*Melosira*) of the kind which drift in the surface waters of the Arctic Ocean. Dr. Koettlitz relates that he has found grass in a bear's stomach, and it had not eaten this from sheer hunger, for together with the grass, in the same animal's stomach, there were found a quantity of seal-remains, and he also tells how he once saw a bear, after having made a full meal of seal, walk three miles to some grass and eat a considerable amount of it. It would seem, therefore, that it feels a need for vegetable food.

Nathorst and Kolthoff relate that on King Karl's Land (wiche Land) in August, 1898, they found

nothing but grass in the stomach of two bears which they had shot. A field of grass on the south side of a mountain had been trampled all over and partly cropped by bears.

Nordenskjold says that in the stomach of a bear shot on Dickson Island in 1875, nothing but grass was found, and that the sealers call these old, grass-eating bears "land-kings."

When he has the chance the bear also eats the black crowberry (*Empetrum*) and bilberries, and in the latter case often devours the whole bilberry plant as well. It may also eat other plants such as mountain sorrel (*Oxyria*), and sea-weed (*Laminaria*) and the like.

It does not appear to have particularly keen sight, or good hearing, but by way of compensation its scent is excellent. It is chiefly by this means that it finds its prey.

It is constantly on the move, hunting for seal, preferably tacking up against the wind, and it can scent a seal at an incredible distance.

In order to reach its prey, it will display remarkable cunning. Although it both swims and dives, it cannot of course, catch the swift seal in the water, and must therefore for choice take it on the ice. But this is no easy matter, for the seal is a watchful animal; it lifts its head at short intervals to look around it, and it has good sight, and always lies close to the water ready to throw itself in at the first sign of danger.

The bear observes from a long way off exactly where the seal is lying, and proceeds to creep forward keep-

ing under cover behind hummocks and elevations on the ice. In order to deaden the sound of its advance it is said to be able to turn its paws, so that the furry side is downwards, and thus to steal quite noiselessly forward. I have not seen this myself, but I have observed that, when it wants to, this great animal can advance amazingly soundlessly over the ice.

If there are no longer any rugged ice to conceal itself behind, the bear is able to propel itself on its stomach over the flat ice, nearer and nearer the seal. It is, of course, partly protected by its white color, so that the seal does not very easily become aware of its presence, if it does not look in exactly the right direction. If the seal lifts its head, the bear lies still; when the seal puts its head down again, it again advances. The only dark things about the bear are its nose and its eyes, and it is said that in order to hide its nose it will put its paw in front of it like a screen, when it is pushing itself forward; but I have not seen this myself. On the other hand I have remarked that it can display extraordinary patience when trying to reach its prey by stealth, as will be seen from descriptions farther on.

When the animal has at last got near enough, it hurls itself like lightning, with long, cat-like bounds, upon the seal.

If the ice-floes are flat, so that there is no cover for it while creeping up behind the seal, it will sometimes dive under the floes, and appear suddenly in the opening beside which the seal is lying.

Even on isolated floes out in the water the seal is not quite safe, for the bear will slip noiselessly into the

water from the nearer edge of the ice, and swim out to the floe with only the extreme tip of its nose above the water. When it has got to within a suitable distance, it dives right under, and comes up just by the edge of the floe where the seal is lying, and then it will be a near thing whether the latter can reach the water on the other side before the bear has its claws into it.

The bear can also lie flat by the edge of the ice, and watch for seals or small whales which are swimming in the water. Should one of these come near enough, it will make a sudden spring down upon it, fasten its claws into it, and try to drag it up on to the ice.

In the winter and the spring the polar bear, like the Eskimo, will keep watch by the seals' breathing holes on the ice near the coasts and in the inlets of the Arctic lands, as has been described in Chapter IV. On the firm land-ice the seals (that is: the floe-rat and the bearded seal) keep small holes always open, so that they can come up and breathe. They have also larger holes, through which they can come right out on to the ice. By these holes the bear may lie for hours with a paw by the opening ready to strike as soon as a seal puts its head up.

The bear can quickly dispose of the young seals and the smaller species of seals with a few blows of its paws, or by biting them in the neck. But the bigger seals, and particularly a big male bladdernose, may show fight. I once arrived at a spot on the ice where there had been a fight of this kind between a bladdernose and a polar bear. The tracks in the snow showed how they had danced around. The bladdernose makes

snapping bites, and the bear strikes with its paw. On this occasion the body of the bladdernose lay there. Part of the blubber had been eaten, but the meat had been left untouched. The numerous scars and gashes showed that the seal had not given in very easily.

Besides its superior strength, the bear has, of course, the advantage on the ice that it is much more mobile than the seal. In the water, on the other hand, it is the other way; there a bladdernose is entirely superior to the bear.

It has also been supposed that the polar bear is able to capture the walrus, but I do not believe this to be the case. Although I have seen both walrus and bear in the same district on Franz Josef Land, I have never seen a bear go after walrus, and the latter were completely indifferent with regard to the former; the bear might pass close alongside them without their taking any notice of it. It is quite plain that they felt themselves to be safe and the master of the bear.

The bear is not capable of killing a full-grown walrus. Apart from the formidable tusks, which the bear will be well-advised to keep away from even on the ice, and of course still more in the water, where it would be hopelessly at a disadvantage, the walrus' skin and blubber-layer are so thick that it would not seriously feel a blow from a bear's paw. I have seen a bear carefully scraping with its claws both the meat and the blubber from carcasses of skinned walrusses; when it came to places where the skin remained, it of course tried to tear this off too, but was not able to tear it to pieces.



Captain Krefting and his bear.

It may safely be asserted, therefore, that the walrus is the only animal, land or ice animals in the Arctic Ocean that the bear cannot tackle, and it is the only one which he avoids.

On the breeding-grounds in the Jan Mayen sea, where the saddleback brings forth its young, as described earlier, many bears are to be found, and they have a rare time with the seal-pups, which are an easy prey, as they do not, of course, enter the water until they have cast their woolly covering.

The bear will then often play with the pups, as a cat plays with a mouse; it will pick one of them up in its mouth and throw it high up into the air, roll it like a ball over the ice, give it a knock so that it tumbles over, and then perhaps take a bite, but leave the little creature half-dead, to begin the same game with another one.

As I have said, it is mostly the young seals that the bear catches; it is rare to find the remains of old seals which it has killed.

If food is plentiful, the bear prefers to eat only the blood and the blubber, but when food is hard to come by, the young seals will be entirely devoured. It may be mentioned in this connection, that one frequently comes across the tracks of a fox and a bear together upon drift-ice, even when it is hundreds of miles from land. The fox follows the bear in order to enjoy the latter's prey. The bear will make its meal off the blood and the blubber, while the fox comes along afterwards and appropriates the flesh. It does not care so much for the blubber.

As regards the courage of the bear and the extent

to which it is to be feared, opinions vary greatly. Some authorities have made it out to be quite harmless, while others have drawn exaggerated pictures of its ferocity. In old accounts of travels in the Arctic seas, it is often depicted as a terrible monster, which attacks and kills man after man, and for fighting which, large parties of men have to be called out.

My opinion is that the behavior of the bear depends very much upon where and under what circumstances it is met with. In regions where it is often hunted, and where its appearance has in consequence become less frequent, it is usually timid, and retires as soon as it scents man; in such cases it may be difficult to approach. On the other hand in districts where it is not accustomed to encounter human beings, it is quite a different animal. On the drift-ice, for example, off the east coast of Greenland, and also in the Polar sea north of the New Siberian islands and westward from them and off Franz Josef Land, it is not at all timid, and in most cases the male bear in particular will come straight towards men as soon as ever it catches sight of or scents them. In the majority of cases it is not perhaps exactly its intention to attack, even though it may smell warm flesh; it is probably more a case of curiosity; it wants to find out what this creature may be, so it comes slowly, shambling along, and stares and sniffs; after a while it may wander off again, if it is not shot.

But on a good many occasions I was left in no doubt that it was coming with the definite intention of attacking. Several of the bears that we shot on the ice off

Greenland came stealing stealthily upon us like a cat after its prey, and on two later occasions in my life I have actually seen it make an attack. The first occasion was during the "Fram" expedition in the winter of 1894, when in the darkness a bear set upon Peder Henriksen, and bit him in the hip. He hit it on the head with a lantern, and nothing further happened. The other time was when my comrade Johansen was struck down by a bear, which had stolen upon us from behind, but left him and went after the dogs without biting him. In this latter case it was a she-bear who had two large cubs with her, and who presumably attacked us because she was hungry.

On other Polar expeditions it has several times happened that men have been attacked on the ice by bears without the bear having been previously attacked or injured.

During the German expedition to the east coast of Greenland in 1869-1870 it twice happened that men were attacked by bears. On one occasion one of the scientists, Børgen, was even dragged away for a considerable distance. It was on a winter's night, and he had been out to read the thermometers, which were set up on shore at a little distance from the ship. He was coming back when he heard something padding along behind him. He turned round and found himself face to face with a bear. He had no time to cock the gun which he had with him, so he tried to frighten the bear by thrusting his bull's-eye lantern into its face, but the animal without taking any notice of this knocked Børgen over, bit him twice in the head, and

dragged him off. His cries for help were heard on the ship, and his comrades rushed to his aid. Shots were fired to frighten the beast, which dropped Børgen and moved off a couple of paces, but came back again and towed him on over the uneven ice at a gallop. At last it let him go and took to flight. Børgen was seriously injured, but recovered. His thick fur cap had saved his head from too severe damage from the bites.

If the bear has enough food, and is not disturbed, I do not believe that it will attack human beings. On the saddlebacks' breeding-grounds it can be quite friendly. It has often come and sniffed at the piles of skins, and gone off again without showing any hostile design. The men stood by and watched; they had not as a rule any rifle with them, but only seal-clubs, which are not much of a weapon to tackle a bear with.

On one occasion my boat-steerer, Kristian "Balloon", during the slaughter of the young seals had just collected together as many skins as he could tow, had got the drag-rope made fast, and was just about to harness himself to the load for the journey home, when a bear came and sniffed at his skins. He took no notice of the bear, but proceeded homewards with his freight. The bear followed close at his heels, and thus they came marching forwards towards the ship, the "Balloon" in front with the skins, and the bear jogging good-temperedly after, until at the approach of men running from the ship with rifles, it took its departure.

Hunting the Polar bear with modern fire-arms cannot be said to involve much danger. At the short range which one is as a rule able to reach, it provides

a target which one cannot easily miss. But several bullets are sometimes needed to finish it off, unless the brain or the vertebra of the neck be pierced, in which case life is instantly extinguished, just as if one had blown out a light.

If the bear is wounded, it will usually run away, unless one be so near to it that it finds itself forced to defend itself. On the other hand I have on several occasions seen a wounded bear which was already in flight turn and give battle.

The walrus-hunters from the north of Norway will often, like the Eskimo, attack the bear with a lance. This is by no means a sport without danger. One must be quick as lightning when driving in the lance, for the bear can evince an amazing agility in parrying the blows, and it has powerful jaws. Scoresby tells that a polar bear once bit "a lance in two, though made of iron half an inch in diameter."

Polar bears are not sociable animals. They prefer to wander over the ice fields alone, and it is a rare thing to find several full-grown bears together or near each other, except where the seals are thick on the ice, as for example on the breeding-grounds of the saddle-back, or where seals or walrusses have been caught and many carcasses are lying around on the ice or the shore. It may also happen that several bears will assemble where a dead whale has drifted ashore or on to the ice.

Male and female are only together during the mating season, from about March to May; this season often begins only at the end of April or the beginning of May, and lasts but a short while. The cubs accom-

pany the mother for from one to two years, and the two young bears seem to keep together for some time after the mother has left them. Sometimes the mother will have a new litter, and the young of the previous one will still continue to accompany her, so that there are then five together; but this may be regarded as exceptional.

During the light season of the year, the bear is on the move principally at night, and one sees it less often during the day-time when it prefers to stay quiet and sleep.

The female's period of gestation is about nine months, and she usually gives birth to her young in January and February. Usually there are two cubs, but it may often happen that there is only one. I have never seen three, though there may be cases of this.

The she-bear shows great tenderness towards her young, and she does not desert them, even in extreme danger. She is much more shy and wary when she has cubs, and prefers to keep out of the way when she sees anything suspicious, such as human beings. On these occasions she employs numerous devices in order to get the cubs away with her as quickly as possible. She will run on in front in order to show them the way and entice them after her, then come back to hurry them along, push them forward with her paw, or thrust her head in between their legs from behind and throw them forwards, then run on in front again and so on. In these various ways they can make such good progress that it is often remarkably difficult to

follow them or to overtake them on the ice, unless the cubs are quite small.

But if anyone gets so near to one of the young ones that the mother thinks it is in danger, she will come at top speed to its defence; showing her teeth and making a spitting sound, she comes forward and crouches for a spring, and if one has not got a rifle, one ought to be careful. Then she returns to hurry on the cub, and so round again to make another stand. I have seen this on several occasions.

If the cubs are small, they will not leave their mother, even if she be shot. I know of one case, where the two little ones accompanied their dead mother when she was being dragged down to the boat, licking her and nosing at her. When they saw the bear being taken into the boat, they sprang after her, and seating themselves upon her, they let themselves be carried quietly off to the ship.

There has been much difference of opinion as to whether the polar bear hibernates, as does our brown land-bear.

Several Polar explorers have declared that it must do so, because they have noticed that the bears always disappear during the darkest period of the winter. This may, however, be due to the fact that in the neighborhood of the explorers' winter quarters, far away in the ice regions, the ice closes up entirely during the coldest part of the winter. The seals then disappear from these regions, and the bears follow them to tracts where there is more open water between the ice.

From all the experience that we have now acquired, it is clear that the polar bear does not hibernate. When we were on board the "Fram" we often received visits from bears during the very darkest time of winter, and they must, therefore, have been wandering around over these wide ice-fields far from all land.

As Dr. Koettlitz has told us, the British expedition to Franz Josef Land in 1894 to 1897 came across more bears in January, February, and March than at any other season; whereas Johansen and I in our winter hut in the northern part of Franz Josef Land did not see any bears at this time of the year. Clearly the explanation is that where we were so far in the north, the ice was frozen firm, and there were no openings, the consequence being that there were no seals; the British expedition, on the other hand, lay off Cape Flora on the southern side of Franz Josef Land, where there was much open ice in the neighborhood, and consequently plenty of seals.

It has fairly often occurred that holes have been found, which have been dug by bears in the snow drifts between the ice-hummocks or on the fore-shore along the various coasts. But there has been nothing to show that the bears have actually hibernated in these holes. In many cases they have only been holes which the bears have dug for protection in bad weather.

It would appear to be customary for the she-bear, when the breeding time is at hand, to dig a hole of this kind for herself to bear her young in, and she probably lies here with them for some weeks after the

birth. There have, however, also been cases where she has brought forth her young on the flat ice under the open sky during the bitter cold of the Polar night; how in such a case she is able to protect these little creatures is a mystery.

The cubs are remarkably small and helpless, when they first see the light; they are about the size of a small rabbit and are said to be blind for some weeks. The mother suckles her young for from one to one and a half years. But the cubs do not live exclusively on milk during the whole of this time, they also get portions of seal. On Franz Josef Land Dr. Koettlitz found, for instance, one-year cubs in the company of their mother. The mother had milk in her teats, but portions of newly-killed seal were found in the stomach of the cubs. This she-bear was shot on January 15th, and the cubs then weighed well over 200 pounds.

It seems that the bears often have fights with each other, especially, of course, the male bears. It is quite a common thing to find on adult he-bears, big wound-scars, and sometimes also fresh wounds, often festered. One may assume that these wounds are usually caused by bear-claws in fights between males for a female during the mating season, and such fights may well be pretty serious ones. It may also happen on occasion that the bites have been caused by a seal which the bear has had a fight with, especially if the seal has been a full-grown male bladdernose.

Nor is it unreasonable to suppose that the bear may have been attacked by a walrus when swimming. The walrus in such a case is capable of inflicting a grievous

wound with its great tusks, and it may easily kill the bear. Dr. Koettlitz relates one case, where he found on a bear four ribs which had been broken and partly set again; there were also the marks of a large external wound. I can well believe that this was the result of a stab from a walrus' tusk.

The bear being as a rule well coated with fat floats easily, and is therefore able to cross long stretches of open water. Thus it has frequently happened, that a bear has come ashore on the coast of North Norway, and even far south of Norway, having obviously swum a great distance from the ice on which it had been drifting. It can also dive, and remain some time under water; but it is not a rapid swimmer, and does not progress so quickly that a rowing boat will not overtake it quite easily. If, therefore, one can succeed in driving it down into the water, and then pursue it in a boat, its fate is sealed.

The sealers often take it alive in this way. They throw a running noose from the boat round its neck and tow it to the ship, where a strong rope is put about its waist and it is hoisted inboard with the derrick, dropped straight into a cage which is kept in readiness, and barred in, while it rages around and tries to smash everything to pieces. When a grown bear is taken alive in this manner, it is reckoned a fine catch, as it can be sold for a high price to the zoological gardens.

But should it get free, it may well be an awkward guest to have on board. I remember one case, when a full-grown bear was being sent in this way from Tromsö to Hagenbeck's in Hamburg by one of our

passenger boats. One night the steamer was in harbor, so far as I remember it was in Haugesund, and the deck-watchman had just gone into the chart-house, when he heard something padding on the deck outside. He looked out and saw a huge white creature in the darkness on the deck. The bear which had escaped! He was terrified and slammed the door. The bear padded past and then entered the smoking-saloon, the door of which stood open. The watchman lost no time in shutting the door on it. The bear became furious when it found that it could not come out again, and began to pull all the furniture to pieces, tore off the upholstery of the sofas, and then went on to tear down all the curtains from the windows.

In the meantime the watchman had aroused men to his assistance, but at first they were completely at a loss as to how they were going to get the bear into the cage again. They were very anxious not to have to shoot it unless absolutely necessary, owing to its great value. Then the ship's doctor came on the scene and he had a scheme all ready. Some chloroform was brought and then, having knocked in one of the windows, they succeeded gradually in squirting through it so much chloroform into the cabin that the bear was stupified, and they were able to bind it securely and get it back into the cage again. So dazed was it after the chloroform that it remained quiet for a considerable time. And in the meantime the cage had been made so secure that it could no longer burst it open.

It is an old superstition among Arctic explorers that

bear-flesh is poisonous. One finds this in old tales of travel as far back as the days of Barents in 1596. And the idea has persisted right up to our own day, as there are still many among those who frequent the Arctic Sea who will not touch bear-flesh. I am myself a living witness that there is no truth in the belief, as we continually ate bear-meat on this "Viking" trip, without any unpleasant effects whatsoever. On the contrary we found the meat good and palatable, and it suited us very well. And later I have often had good opportunities of proving this, especially when Johansen and I were in winter quarters on Franz Josef Land. On this occasion we lived for ten months exclusively on bear-flesh, having no other food of any kind, and we were in good health the whole time.

On the other hand there is a possibility that it is not a good thing to eat the liver of the Polar bear. For my own part I have once or twice eaten it without any unpleasant consequences, but I must admit that I did not eat much, as I had sufficient other food.

Dr. Koettlitz states that on several occasions during the British expedition to Franz Josef Land they tried to eat bear's liver, and those who did so were always very ill after it. They suffered from severe headache, and insomnia, and if they had eaten much, they were taken with nausea and sickness. This might last some seven or eight hours, and they were not able to sleep for a full twenty-four hours. He says that they suffered these effects in spite of the fact that they did not believe that bear's liver was poisonous. He also asserts that the same ill-effect may often result

from eating the kidneys of the bear, though to a much less marked extent. I must say that I have often eaten polar bear kidneys, and plenty of them, at a time, without suffering the slightest ill-effects; on the contrary I liked them very much. Dr. Koettlitz adds that the ivory gulls and other birds avoid the liver and kidneys of the polar bear, rarely eating them, and never more than a little at a time. I must confess that I have never observed this latter circumstance personally, but I am not prepared entirely to deny its accuracy.

It is remarkable, however, how much imagination has to do with diet. In order that the test with regard to bear's liver should really afford proof of its poisonous qualities, it would be essential for those who ate it to be unaware what they were eating.

That bears may attack other bears even when the possession of the female is not in question we once had a proof. It was when Johansen and I were in our winter hut on Franz Josef Land in 1895. One night we had a visit from a huge old male bear, which was extraordinarily thin. There was not an atom of blubber on him, either under his skin or in his entrails, and no doubt that he was prodigiously hungry. He had come after our blubber store, which lay heaped in a pile. We had just shot a she-bear, that had two quite large cubs. These cubs had run away, and we had not yet been able to shoot them, but they remained all the time in the neighborhood of the hut. We had shot the mother in the evening, and the same night they had come back and eaten her stomach and entrails. Pos-

sibly these cubs had also been near the blubber when the old bear had come along.

From the tracks afterwards we saw that he had first chased one of the cubs and killed it a little way off on the ice; then he had run after the other one and killed that too. He had then gone back to the pile of blubber, eaten as much as ever he had been able to swallow, and afterwards lain down and gone to sleep on the top of the pile; there we found him when we came out of our "hole" next morning, and shot him.

It has often been observed by voyagers in the Arctic that the polar bear is possessed of great curiosity. When they have left behind them sacks or anything similar, and a bear has come along, the contents of these sacks have been thoroughly examined. Everything eatable has naturally been devoured, but whatever it could not tackle has been torn into shreds; while some things have been taken a long distance away. This habit constitutes a special danger for depots which have been left for exploring parties, and which the latter will be dependent on when they reach them. A bear may arrive there in the meantime and make a clean sweep, scattering the stores all around, devouring everything eatable, and crushing the food-tins flat.

It is not an easy matter to bury these depots so that bears cannot get at them. Even if one piles the largest sized stones on the top of them, it is of little use, for the bear will throw them down as if they were pebbles. To nail them up in big wooden cases will not suffice, as he will smash such cases to pieces. In my opinion

the best method would be to wind the cases completely round with barbed wire. This the bear does not care about tackling, as it tears the animals paws to pieces, and would at once make him disinclined to proceed further.

In districts much frequented by man, and where in consequence the bear is greatly sought after, the polar bear is becoming a rarity. This is the case, for instance, on the west coast of Spitsbergen, on the west coast of Greenland, and in the regions frequented by the Eskimo. These latter are constantly engaged in bear-hunting, whenever an opportunity offers.

How quickly the bear's numbers may be reduced is evidenced by the experience of the British expedition to Franz Josef Land in 1894-1897. Dr. Koettlitz reports that while during their first year 60 bears were shot, some escaped wounded, and others got away unharmed, during the second year only twenty were shot, one or two wounded, and a certain further number seen. And during the third and last year only ten bears were shot, and some ten to fifteen more seen. The reason for this might be in part that the bears had become more timid and left the district as a result of being hunted. But the chief reason is probably that the number of bears frequenting this region had actually been much reduced.

The safest method of hunting the polar bear is with good dogs. When these are unleashed at a bear, the latter will usually run away; but if the dogs are eager and aggressive, they will easily be able to make the bear stand and defend itself. The best way to attack

is for the dogs to tackle the bear from behind and bite its hind legs, whereupon it will turn round to strike at them. The other dogs then attack it from another direction; it must turn again to face them, and in this manner the dogs will be able to keep the bear busy until the hunter can come close and get in his shot.

When a bear is set upon by dogs, one will often see it go up on to a big ice-hummock in order to defend itself from there. Or it may plant itself with its back to a wall of ice in order to keep the dogs off.

Dogs can scent a bear a long way off, and if one has a really good team, any bear which they may get wind of is as a rule lost.



Polar Bears.

This is the method which the Eskimo employ in hunting bears; but as they have not—or at any rate used not to have—fire-arms, they are obliged to stab the bear with a spear or hurl a javelin at it while it is engaged with the dogs. This kind of hunting with a team of good, powerful Eskimo dogs may be really thrilling sport.

But at other times, when the dogs are not loose, the bear does not seem to bear them any particular enmity. It happened once, during Johansen's and my sledge tour, that a bear came right up to one of our dogs which stood tied up outside the tent. The dog barked, but the bear only sniffed at it without touching it, until I came out and gave Bruin a bullet.

During the British expedition to Franz Josef Land a bear came right up to the encampment, examined the horses which were standing there and the sleeping dogs, but went off again without molesting them. On another occasion it killed a sleeping dog, but went away without eating it.

On the "Fram" expedition, on the other hand, we had an experience to the contrary. One winter night a bear climbed up on to the deck of the ship, where some thirty dogs stood tethered. It first killed one, broke its leash, and carried it away on to the ice and ate it. Then it returned and took another dog in the same way, and ate half of this. It was a young male, and was apparently not at all afraid of the dogs. As a matter of fact it was the same bear which later on attacked Peder Henriksen, and bit him in the hip.

It appears to be the general experience that more male than female bears are shot. The reason for this is clearly that the females are more timid and keep out of the way, while the male bears will more often approach the hunter. The bear sheds its hair in summer, and its coat is not, therefore, so beautiful then as in winter. The fur has lost its glossiness, and in many places, as for instance under the belly, is often thin. The coat has then a more yellowy-white color, but one which very well suits the color of the ice in summer, when the floes are melting on the surface and are often rather dirty and brownish—as described in the next chapter. The winter coat is usually snow-white, and composed of closer, finer hair, which often has a silky gloss and may be very difficult to distinguish from the ice.

Though a polar bear may show much cunning, for instance when it is stealing upon its prey, yet it cannot be said to be an intelligent animal. It has a comparatively small brain. It cannot be tamed like our brown bear, and it is difficult to train. Even if one takes the bears quite young and brings them up, they never really become tame, as the cubs of the land bear so easily do; they remain wild and intractable, and are ever ready to bite and scratch.

XIV

BESET IN THE ICE—BEAR HUNTING

ON *Tuesday, June 27th* (35.6° , a light breath of wind from NE.) the fog lifted, but there was no open water to be seen. This was a bad job—we were completely ice-locked. We did not know exactly where we were, as we had not made any observations for a good many days now; but a comparison with the positions that we ascertained later would seem to show that we were approximately in $66^{\circ} 40'$ N. and $29^{\circ} 40'$ E.

We spent the time in catching sharks, which simply swarmed in the little lane along the side of the ship. I enlisted the help of a few of the sailors, and we caught about two hundred of them.

But I made one fatal blunder. In order to save the trouble of pulling these huge fish up on the ice I got one man to drive his seal-club into their heads and hold them while another slit them open and took out the livers. This can easily be done, as the liver floats up to the surface the moment the belly of the fish is cut open. We allowed the carcasses to sink, but this we should not have done, for all the living sharks vanished from that day onward. No doubt they swam

down after the sinking carcasses in order to gorge themselves upon them.

Now this was very unfortunate, because there were multitudes of these sharks about. Standing up in the crow's nest I had sometimes counted as many as ten or fifteen at once around the ship alone.

On several occasions the propeller cut one of them clean in two and its liver floated up to the surface and was hauled up on board—an easy method of fishing!

In the evening the captain came and told me that the man in the crow's nest had sighted a bear about four miles off. This news quite cheered me up again and I began to rig myself up to set off in pursuit; but while I was doing so the fog closed in and the captain refused to let me go. This made the fourth time that I had been cheated out of my bear, and it looked as if I was fated never to shoot one.

The captain tried to comfort me by telling me that the bear was to leeward of us and would probably move up-wind; but it was no use, I had not much faith in that and slunk off disconsolately to my berth.

Next morning, *June 28th* ($35\frac{1}{2}^{\circ}$ to $37\frac{1}{2}^{\circ}$, calm) I was dreaming about bears which I could not kill, when I was awakened by someone whispering in my ear:

“Hurry up and turn out; there's a bear close by the ship!”

I jumped up and saw the genial eyes of the second mate, Oran, looking into mine. He went on whispering as though the bear was just outside the cabin door: “But you must look sharp!”

And look sharp I did! I threw on my clothes and

hurried out on to the deck with my rifle and ammunition. There was the bear right enough and within gunshot too; it was prowling to and fro on the ice with a calmly meditative air, pausing now and then to sniff and gaze at the ship. I had a good look at it while I waited for the captain, who had also been called. The huge white animal against its background of white ice made a beautiful and romantic picture.

At length the captain appeared in the doorway on the half-deck. The moment I turned to speak to him a shot rang out. I started as though I had been stung and swung round to send a bullet after the bear before it disappeared. But to my surprise it was prowling along as coolly as ever, not in the least disturbed by such trifles as a bullet hitting the snow beside it. The shot had been fired by Hans Halvorsen, one of the gunners, who had not been able to stand the temptation any longer.

Meanwhile the bear had moved a little farther off, where it was out of range. We fried some pork on the deck in the hope of enticing it back by the appetising odor. The ruse was successful, for the animal soon stopped and began to sniff the air; and I was down on the ice like greased lightning.

I advanced cautiously and was quickly within gunshot. The bear had seen me, and proceeded to climb up on to a hummock to get a better view. Here he presented a capital mark; I aimed just behind the shoulder and pulled the trigger. But the rifle only clicked, and what was worse, the cartridge jammed.

I broke my nails in trying to loosen it, and at last got it out, and another cartridge in.

Fortunately the bear had not run away during all



"It climbed on a hummock to get a better view."

this, but had come nearer and turned its broad chest full towards me. I aimed straight at the "eddy" of fur there, and this time the rifle went off all right.

The animal roared, bit at the wound in its chest and rolled over; but struggled up again and made off. I sent a bullet into its hind-quarters, which were all I had to aim at. The bear roared again and went on faster than ever, while I pursued it from floe to floe.

Presently coming to a gap between two floes which was too wide for it to jump, the animal plunged into

the water. This gave me time to catch up, and when it climbed on to the ice on the other side of the lane I fired another bullet between its shoulder-blades. The bear tumbled back into the water, its little black eyes blazing with rage, and a final bullet in its neck put an end to its sufferings.

The fog had become so thick that I could not see the ship, but the people on board had heard my shots and they soon came and helped to drag the animal to the vessel.

I had shot my first polar bear, and felt correspondingly pleased as I received the congratulations of the captain and the others.

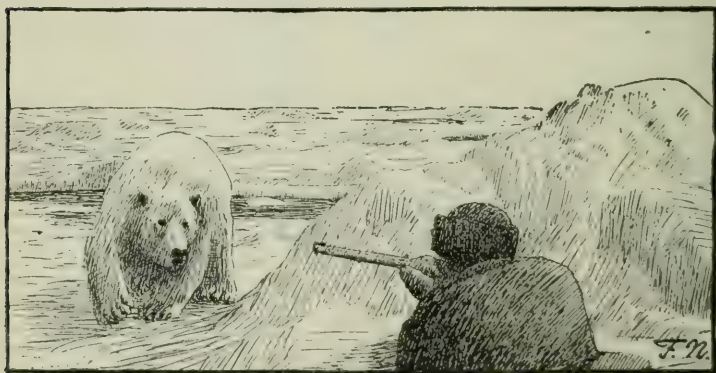
I thought it strange that my first bullet had failed to kill the creature. It was a hollow express-bullet of 450 bore with copper tube. I found that it had hit the animal all right, but had expanded in the outer layer of fat, and only the solid piece at the back of the bullet had penetrated into the chest. It was just the same with the other bullets: they had ploughed up large surface-wounds but had not penetrated to any depth. I made a mental note that I would use solid bullets next time I went bear-shooting.

On the evening of *Friday, June 30th* (39°, a breath of wind from SE.) we were having our dinner, and had just begun the pearl barley frumenty, when the gunner Hans Halvorsen came into the cabin and announced that there was a bear quite close to the ship. The skipper and I took our rifles and started off in the direction indicated, but we did not hurry much as

the bear was said to be occupied in eating the carcasses of some seals we had recently killed.

We soon caught sight of the animal and made our way towards it. The ice was rough, and difficult to traverse; so we had to take our time and advance in a very roundabout way. At length we mounted a tall hummock, and the bear saw us.

We crouched down, but in order to excite its curiosity we popped our heads up from time to time above the edge of the ice. It began to approach us at once, now under cover of pieces of ice, now across the flat



“We waited as long as possible before firing.”

floes. A fine, full-sized animal, it came on towards us with long strides, advancing rapidly although it seemed to be taking things easy.

We waited as long as possible in order to have a good look at it. Now it had already reached the hummock about twenty yards ahead of us. There was its head peering cautiously over the edge. A huge head it was, too, about as big as a good-sized portmanteau. But

there was no need to shoot yet, for the animal could not possibly escape now that it had come so close.

The head swayed this way and that, then disappeared again behind the edge of the hummock.

We held our rifles in readiness, for one never knew where it would turn up next. Ah! There it came, shambling along on one side of the hummock with its chest fully exposed. Our shots rang out simultaneously. A roar—the bear sank on to its haunches, bit at the wounds, staggered back a few paces, and then rolled over.

What a beautiful sight it looked, as it lay there with its yellowish-white coat against the white snow, the crimson blood dripping from its chest. It seemed so unfair that a little bit of lead should suddenly bring to an end that free life on the boundless expanse of ice.

Some of the men came and pulled the carcass to the ship, where it was duly skinned. It was a big he-bear, measuring over seven and a half feet from the muzzle to the tip of the tail, and incredibly fat both outside and in. The layer of outer fat under the skin on the hind quarters was some 3 or 4 inches thick. The bear puts on fat in summer when there is plenty of food to be had, and lives on this when times are bad, especially in winter when seals are scarce.

We had used solid bullets this time; these had entered right in the middle of its chest within half an inch of each other, and had traversed the whole length of the animal's body.

On *Saturday, July 1st*, ($37\frac{1}{2}^{\circ}$, light NNE wind) it rained, which is rather a rare occurrence up here.

The ice remained as tight as ever, and the tempers of the crew were correspondingly sour. It was pretty exasperating to be lying here idle when the other vessels were sure to be among the seals and making a good catch.

Toward evening it cleared and the sun came out. From the crow's nest land was sighted on the western horizon; this was Greenland, and what we saw were mountain peaks on the still unexplored part of the east coast. A new and thrilling experience for adventurous youth.

Next day, *Sunday, July 2nd*, ($35\frac{1}{2}^{\circ}$ to 43° , light wind from NNE) we were favored by brilliantly sunny weather, and I hastened to climb up into the crow's nest to have a look at this wonderful country. We had drifted a little nearer since the previous evening, and the coast with its long line of mountains was visible from south of the west and right up to the north.

The land was largely snow-covered, and one could see that there were numerous glaciers and fields of eternal snow; but there were bare stretches too, and dark crags. The true inland ice, which covers the whole interior of Greenland, was out of sight, hidden behind this belt of rugged, craggy coast.

A good many large icebergs lay among the drift-ice in the same direction, looking like snow-clad islands, and scarcely distinguishable from the mountain peaks on land.

This part of the east coast of Greenland, from 66° N. north-eastward to 69° N. was entirely unexplored at that date. Many attempts had been made to reach

it, but no one had yet succeeded. The land seemed to hide securely behind the wide belt of drift-ice which always remains closely packed in Denmark Strait, hindering access to the coast from the direction of the sea.

The thoughts coursed rapidly through my brain as I sat in the crow's nest with the telescope, following the lines of the mountains from summit to summit. How interesting it would be to make one's way in there, wandering along the valleys, and crossing the mountains and glaciers where no European had ever set foot! Was there no way of gaining access to it?

The captain obtained observations of latitude and longitude that day and found that we were in $66^{\circ} 48'$ N. and $30^{\circ} 35'$ W. It seemed remarkable that our latitude should be so far to the north: could the drift of the ice have carried us in a north-westerly direction? Yet the current in Denmark Strait was supposed to run towards the south-west; so the whole thing was rather strange.

A constant look-out for bears was kept from the crow's nest. As long as we remained beset in this compact ice bear-shooting was the only kind of hunting in which we could indulge.

In the evening of the following day, *July 3rd* ($37\frac{1}{2}^{\circ}$, light wind from NNE) I was engaged in obtaining samples of sea-water from various depths when a bear was reported on the lee quarter. The water-bottle was quickly laid aside. I could see the bear from the deck.

While the captain and I were getting ready to start,

it had lain down behind a hummock. We took its bearings and then set off.

Presently we caught sight of it again upon the hummock. The ice was none too easy to traverse; we had to make many detours and jump from floe to floe. But there was no hurry; all we had to do was to keep well to windward so that the bear might scent us, and we were sure of it; that usually brings it quickly enough.

At length only one jump separated us from the floe where we had seen the bear lying. When I jumped, the edge of the ice broke under my feet; fortunately I just managed to reach the edge of the other floe with my arms and rifle and the upper part of my chest, so that only my legs and the lower half of my body fell into the water.

The captain got across too, and we walked towards the hummock, hoping that the bear was still lying there.

Everything was quiet, and we began to be afraid that it had gone away, when suddenly its head appeared above the edge.

We immediately lay down flat on the ice. This, we thought, would render it more inquisitive, and was less likely to frighten it than the sight of our tall, threatening figures.

But the bear remained calmly lying where it was, and looked at us long and carefully in its usual tranquil fashion.

Its head moved to and fro, then disappeared behind the ice; but soon appeared again looking as calm as ever.

This was getting a trifle tedious. Moreover we had

not selected a particularly comfortable spot for lying on, right in the middle of a pool; still, we wanted to have a better look at the animal before firing. Presently, however, its head slowly withdrew behind the ice again.

Now the whole bear came into view, jogging forward along the side of the hummock. It sniffed and nosed the air as though it enjoyed the scent of warm flesh. Step by step it came lurching towards us. Most of the time it made as though it was not aware of our existence and had not noticed anything out of the ordinary; beyond occasionally raising its head to sniff at us it avoided looking in the direction where we were lying.

The bear turned aside to mount the nearest hummock. The captain immediately fired, and the animal reared up and fell back. I sent a second bullet into it. The great animal groaned once or twice like a human being, and all was over.

The crew were quickly on the scene, for they had all been watching the hunt from the tops and yards. The bear, a young male, was dragged to the ship. It was soon skinned and cut up and the joints of meat were hung from the davits in the customary way, to the lively satisfaction of all who did not believe in the old superstition that bear's meat is poisonous. As this bear was a young one, its meat was even more in demand than usual. The tongue and the heart, which were looked upon as special delicacies, fell to the share of the hunters. The skipper had learnt to appreciate bear's heart now; when I first proposed eating



“ . . sat there, obviously considering its plan of operations.”

it he had scorned the very idea: “Fancy wanting to eat that tough bit of muscle!”

We turned in late that night. I had to finish taking my water-samples down to a depth of a hundred fathoms, and the captain grumbled a bit at my being so long about it, for neither of us could turn in before the other. But at length we got to sleep at four in the morning.

We had not been long asleep, however, before we were aroused by the news that another bear was in the offing (*July 4th*, 39°, light wind from N). This time I took my express-rifle, which I had not used since I shot the first bear. I wanted to make quite sure that a solid bullet really was better than an expanding express-bullet.

Taking Kristian "Balloon" with us we set off. This time we had a longer distance to walk than usual.

After a bit we saw the bear about 1500 yards away. It had seen us already, for it was standing up on its hind legs and craning its neck to obtain a better view of us. Then it climbed on to a hummock and sat there, obviously considering its plan of operations.

We availed ourselves of this breathing-space to negotiate one or two difficult places under cover. After crossing several small floes I found myself some way in advance, and went up on to a hummock where I lay watching the bear while I waited for the captain to join me. As he came up behind me I bent down to take his rifle, and when I looked round again the bear had disappeared. We went a little farther on to a larger hummock which we thought would be a good coign of vantage. As we neared the top we held our rifles ready in case of emergencies; but once there we looked and looked in vain—no bear was to be seen anywhere, although the ice was tolerably level. It must be somewhere near either in the water or slinking along towards us behind the hummocks; so we lay down and waited. We cocked our guns and held them ready, for the bear might be upon us before we knew it. Then we noticed a slight ripple on the surface of a patch of water hardly fifty yards away, and after that we detected a dark speck moving slowly in our direction, which was evidently the nose of our bear.

We lay perfectly quiet, for this was too exciting to be interrupted until it became absolutely necessary.

The black nose moved this way and that as it ap-

proached us, and every now and then the animal's eyes showed above the surface too. It appeared to be looking about for a place to climb up on the ice without being seen. Once or twice only it rose a little higher out of the water to look at the ice, evidently in order to choose the best line of approach.

At length it vanished under the edge of the ice-floe which lay nearest to ourselves. A moment or two later its forehead and eyes peered cautiously over the edge; it wanted to see where it should go next.

For some time it stayed there motionless, and I could see the little black eyes looking this way and that, and sending an occasional hungry look in our direction.

Apparently it did not like the look of things; the top of its head sank slowly down again beneath the edge of the ice, and presently its nose reappeared, gliding along on the surface of the water. Here it swam backwards and forwards for a time, while its eyes peeped up now and then above the surface as before.

At last it disappeared behind a hummock and we saw no more of it for quite a long time. We began to look about us, for the animal might have dived. But its forehead and eyes rose noiselessly above the edge of the hummock, behind which, no doubt, it had crept up on to the ice.

The bear gave us a long scrutinizing look as we lay there on our hummock; then withdrew its head again below the edge of the ice.

This was repeated several times at long intervals. The bear was in no hurry to make up its mind. We,

on our part, could give ourselves plenty of time too, and the performance was quite entertaining. We agreed to wait as long as we could, although the skipper complained bitterly of having to lie with a cold ice-compress under his stomach, and the "Balloon" of having no more tobacco for a decent chew.

Obviously the bear was nonplussed; it did not know how to steal upon us, for there were no more pieces of ice to hide behind. At last it took a decision; after its head had been out of sight longer than usual the animal came shambling along straight towards us in the open. It gave a terrific yawn, curling its tongue almost up into its eyes.

"Oh, good mornin', good mornin', old man!" exclaimed the "Balloon" out loud. We could not help laughing, but told him to keep quiet. The bear was lurching along towards us on a zigzag course, apparently quite indifferent and without looking in our direction. Every time it went about it stopped, yawned again, cast a fleeting glance at us and sauntered on from floe to floe, trying the edge of the ice carefully with its paw before crossing. Occasionally it would sniff a little in our direction, but the next moment it was as unconcerned as ever, and thinking of nothing but the ice on which it was walking.

As a matter of fact it made very light of the ice. If an ice-floe sank under its weight, it merely stepped on to the next without altering its leisurely pace.

When it was turning for the last time before reaching us, a large piece of ice lay in its path on the edge of a floe. This was of such a size that a man would have

found difficulty in pushing it into the water; and there was ample room to go round it. The bear merely gave it a shove with the back of one of its fore-paws, and in the ice-block splashed. There was no sign of exertion in the movement, which suggested an uncanny amount of strength. The "Balloon" could not refrain from exclaiming aloud: "Blimey! You're a bit of a tough, aren't yer?"

Now it was making straight for us and not more than ten paces off. I was to fire first, and the moment it crouched before springing to where we lay I sent a bullet right into the middle of its chest. It roared with fury, bit at the wound as usual, reeled back, struggled up again, and made off.

The captain sent a bullet into its hind quarters to hamper its movements.

My cartridge had jammed again and I had a good deal of bother before I could get it out and another one in. We were both of us ready to fire, but the bear was now in the water. When it clambered up on to the edge of the next floe its back presented a good target. Our shots rang out simultaneously and the bear, hit between the shoulder-blades, fell back into the water. Once more it climbed on to the floe, but a bullet from the captain stopped it, and it tumbled into the water again. A few convulsive struggles and it was dead.

It was an exceptionally large and handsome bear. We were three pretty strong fellows, and the edge of the floe was low and sloped evenly down to the water, yet we had our work cut out to haul it up. We made a noose of the "Balloon's" drag-rope and drew it tight



Skinning the great bear.

round the bear's neck, but the creature showed a remarkable capacity for "slipping its collar." A couple of turns round its muzzle put this right, and at length we pulled it up.

The express-bullet in its chest had made gaping wounds, but had not broken the breast-bone. It had made such large external holes that in three different directions I could stick my hand in, but only a splinter of the bullet had penetrated into the lungs. Most of the wounds were superficial, in the blubber and the flesh. After this I decided to give up using express-bullets, and keep to solid ones, when bear-shooting.

The captain obtained some altitudes that day and found that we were in $66^{\circ} 50'$ N. and 31° W., i.e. two minutes farther north and ten miles farther west than we had been two days ago. This would mean a drift of 5 miles in twenty-four hours approximately west-north-west and dead on to the land.

This certainly seemed very strange, in view of the strong set of the current to the west-south-west outside the margin of the ice, which may be so strong as to make it hardly possible for a ship under sail to beat up against it and a north-east wind without losing its latitude.

Could it be explained by the fact that we had crossed over the bank towards Greenland, into water that was shallower and therefore had a weaker current? Probably the main current followed the edge of the bank along the deep lead through the straits. But there was strangely little movement noticeable in the ice, which

lay as tight as ever without any sign of pressure or slackening.

On *Wednesday, July 5th* ($37\frac{1}{2}^{\circ}$, light wind from N.) we saw no bears. This seemed strange. The ice remained tight and without any visible change, but for all that we were now much nearer to the coast.

It had become difficult to keep the crew employed now, while we were drifting here in the ice without any seals to hunt. The hands were set to do all sorts of "clean-up jobs." The ship was cleaned and polished up, the rust was chipped from everything made of iron, both inside and outside, and the clanging and hammering made one think of a ship-yard. The paint-brush was busily employed, and it was marvellous to see how spick and span it made the chain-plates and the dead-eyes and the funnel, and all the iron fittings, first with red-lead and then with black paint—reminding one of Sunday on land with the "go-to-meeting" clothes and shiny top top-hats. The masts and yards were scraped and oiled, and the hull was painted black again, for the ice had long ago scraped off most of the paint it left home with. The sides of the half-deck were painted white.

Being desirous of getting some idea of the animal life that inhabited the water under the drift-ice, I experimented at various depths with my little tow-nets made of fine netting, which I hung out for a short while and then drew up; in this way I secured a good many small creatures, mostly crustaceans.

Then I thought I would see whether I could catch still more by putting some sort of bait in the net. I

hung some bits of flesh and blubber in the mouth of my largest tow-net, which was a good 20 inches in diameter, lowered the net fifty or sixty fathoms down, and left it there for several hours.

After that we jerked the net violently two or three times in order to catch any creatures which might have assembled around the bait, and drew it up as quickly as we could.

To my great joy I found some very large prawns (*Pandalus*)—larger than any I had previously seen—inside the net.¹ We thought they might almost have been small lobsters, for their bodies were nearly six inches long.

This find aroused the interest of the skipper; prawns were a delicacy, and he detailed a man to fish for them from the ice. Before long so many had been caught that we could have a dish of them for breakfast. They were perfectly delicious and gave us a taste for more; so the fishing went on, and we had prawns for breakfast several times.

I carried on various other investigations and studies as the opportunity occurred. For instance, the ice and its various forms gave me plenty of food for thought.

It struck me as being particularly strange that the surface of the big floes in this heavy ice was not of a pure white, but had a dirty greyish or rather brownish tinge.

¹Professor Hjort's investigations sixteen years later revealed large quantities of these at the bottom of several Norwegian fjords, and since that time they have become quite an important fishery. Previously they were little known, though a few were caught in the Drammen Fjord, and were called Drammen prawns.

How could this be accounted for? Was it dust from land? Hardly, for only very few of these floes could have been near enough to snowless coasts for the dust from thence to have blown on to them.

A better hypothesis was that dust was everywhere present in the atmosphere, even above the Arctic Ocean, and that this is carried down on to the ice by every snowfall. When the snow melted in summer it would collect in a thin layer on the surface of the ice.

This was the most satisfactory explanation I could find. But I noticed that in some places this dust had accumulated in small patches of mud which, being dark in color, had absorbed the heat of the sun, thus melting depressions, or even round holes in the ice, into which it had sunk. When I held some of this mud in my hand it seemed to me to smell of organic matter, and I therefore inferred that it was partly composed of small plants which might possibly grow on the ice, like those which I had found on the under side of the ice.¹

It was not until several years later—in 1888—that I took some samples and had these subjected to a proper microscopic analysis by Professor A. E. Törnbohm, in Stockholm.²

This revealed the fact that the dirty color of the surface of the ice is really due in a large degree to dust consisting of infinitesimal grains of various minerals

¹Vide F. Nansen: The Drift-ice, its formation, and the way it transports mineral matter, in "Naturen," 1887 (Bergen).

²Vide H. Mohn and F. Nansen: Wissenschaftliche Ergebnisse von Dr. F. Nansen's Durchquerung von Grönland 1888, in "Petermann's Mitteilungen" Ergänzungsheft No. 105, 1892, p. 101 f., and p. 104 f.

which must have descended from the atmosphere with the falling snow, and which most probably came from the lands around the Polar Sea, especially perhaps from Siberia. The dust also contained small organic particles, for the most part tiny portions of mosses which seemed to have grown in soil that was rich in humus, and must consequently have come from the land too.

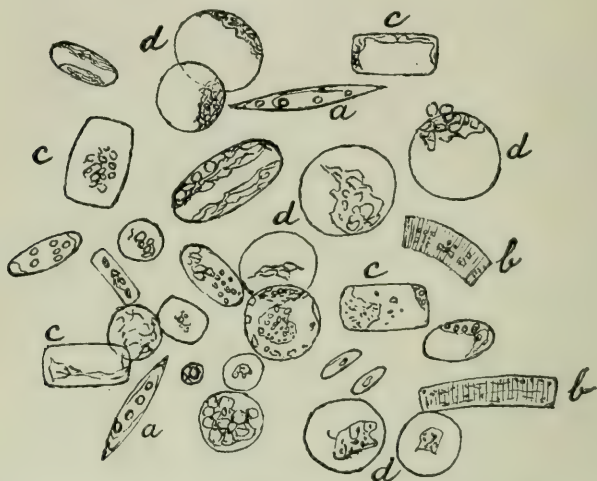
Besides these components Törnebohm found a large number of shells of microscopically small algæ (diatoms) in the samples. These were examined by Professor P. T. Cleve, of Upsala, and proved to be of unusual interest, for they included 16 species, of which 12 had hitherto only been found in the sea north of East Siberia, where they were discovered on an ice-floe off Cape Vankarama, near the Bering Straits, during the Vega expedition in 1879.

This seemed to suggest that there was some connection between the sea near the Bering Straits and the sea outside the east coast of Greenland, and it supplied me with one of the proofs upon which I based my theory that this ice was continually in drift across the North Polar Sea from the sea north of Siberia.

The presence of the above mentioned diatoms may to some extent have been due to their having been in the upper layers of the sea, where they became enclosed in the ice when it froze. When the top layers of ice thawed in summer these diatoms accumulated on its surface.

But during the Fram expedition in the summer of 1894 I discovered that some of these diatoms actually live in the pools on the drift-ice and in the above men-

tioned little holes melted on its surface. Moreover I discovered a number of microscopic animals, protozoa (*i.e. infusoria, flagellates, etc.*) living with them; so there is quite a little community of small beings drift-



Microscopic algae (*diatomaccae*) growing on the underside of the ice-floes.

ing about on this ice and awakening to life every summer when the warmth of the sun melts its surface.¹

When we take all this into consideration we can readily understand how the surface of the old ice-floes in this Polar Current acquires a dirty color after the upper layer has melted away summer after summer. In addition to the dust which comes from the air when it snows, there are the small creatures and other par-

¹Vide: The Norwegian North Polar Expedition 1893-1896. Scientific Results, vol. IV, No. 11, H. H. Gran: Diatomaceæ from the ice-floes and Plankton of the Arctic Ocean (Kristiania & London 1904); and Vol. V. No. 16, F. Nansen: Protozoa on the ice-floes of the North Polar Sea (Kristiania & London 1906).

ticles that float in the upper layers of water, become enclosed in the ice when it congeals, and gradually accumulate on the surface of the ice as its upper layers melt away. And to these are added the plants and small creatures that live on the surface of the floes.

In the eyes of the sailor-men I was a rather mysterious person, and they puzzled their heads a good deal over all my queer notions, such as rummaging in the insides of seals, bears and birds, taking the temperature of the sea, fishing up samples of water, and doing many other equally useless things.

One day the carpenter asked the captain:

"What's he going to be, that there 'Nansen'?"

The captain, who found it rather difficult to explain, suggested that I would probably become a naturalist.

But the carpenter didn't think anyone could make a living out of being a naturalist. "No, I'll tell you what," said he, "he can be a vet."

"Why?" asked the captain.

"Well, I've noticed he's a rare hand at cutting up animals."

I felt much flattered by this unsolicited testimonial.

Some of the sailors whiled away their many leisure hours in carving ships on wooden panels. They were clever with their fingers and reproduced the rigging and sails down to the smallest detail. When finished the models were painted in bright colors: a deep blue sea and a pale blue sky with woolly white clouds, white sails, a black hull, and a red flag and pennant.

The boatswain, who had a proper sense of his own importance, had made a splendid full-rigged ship which

he showed us with great pride. We asked him what name he was going to put on the long pennant. That, he said, was just what he was wondering; anyhow, it would have to be a biggish name.

Hans the carpenter, who was sitting near, suggested putting "Boatswain" on it, adding "that's a big enough name, anyway," with a sly look up at the boatswain. But the latter did not think that would do on the pennant; his own choice was "Queen of the Waves," only it meant painting such a lot of letters.

A little later Hans was sitting on the seat by the companion-way from the men's cabin and playing tunes on a tin whistle. The "Balloon" passed by—

"Come on, 'Balloon,' and I'll blow you up," Hans volunteered. He was a cheery soul.

When we had nothing else to do, the skipper and I took refuge in reading; I had brought with me plenty of literature, including scientific works, books on travel, and novels. Our favorite was Fritz Reuter's "Ut mine Stromtid." Its lively descriptions of spring and summer, ploughed fields, springing crops, the scent of the soil and of manure; with Uncle Bræsig and all the life on the snug, peaceful country parsonage and at Pümpelhagen, made a refreshing contrast to the lonely, shut-in life on the drifting ice. Heavens, how it made me long for a life like that and the sight of a blade of green grass! One could fully sympathize with the sailor's longing for land and understand how an old skipper will dream of a farm or a trim little homestead with a horse and one or two cows in a green field in the heart of the country.

As we were sitting at dinner at nine o'clock in the evening of *July 6th*, the captain remarked that it was time we got another bear, for we hadn't had any sport for two whole days.

I agreed, and thought we deserved to get it with interest, too. I had a feeling that something would soon turn up.

At the end of the meal came the customary thimbleful of sherry and one of the steward's "sweet cakes." We didn't go in much for drinking; this tiny glass after dinner was all that we indulged in.

Then we filled our pipes and settled ourselves comfortably, each in a corner of the sofa with our feet on the table. The captain yarned about his many adventures; and by and by he began to quote Braun:

"I never trouble sorrow
Till sorrow troubles me;
For all I know to-morrow
The joy and mirth may flee.

For life is full of happy things
And every cloud has a silver lining."

How strangely things turn out sometimes. Who would have thought that we should be chumming just like two old friends up here in the drift-ice!

Only eight or nine months ago all this had been like another world. Walking home from the university day by day at dinner time I would often meet on the castle hill a fine looking fellow with a big black

moustache and dark flashing eyes looking out beneath heavy black eyebrows. I began to wonder who he was, for he had the air of an adventurer; and when I heard that he was an Arctic Sea skipper my imagination got to work. Think of all that he had seen and gone through, of all the adventures and perils that had fallen to his lot! He had exactly the fearless and devil-may-care look one expected in a man who sailed the Arctic seas. But in those days I thought of it all as a very far-off, unknown sort of life.

Yet here I was now, right in the midst of that Arctic life, and it had become part and parcel of myself.

Later on in the evening we went forward to see how the men were getting on. Many of them were in low spirits, not so much because we were missing the seal-hunting by lying here, as because there seemed to be so little hope of escaping from the ice. We were drifting nearer and nearer to the coast all the time.

There was no denying that many disasters had occurred in this drifting ice; for if once it began to nip it showed no mercy. But the ice around us was still enough—indeed rather too much so, inasmuch as it showed no sign of loosening either.

Many Arctic voyagers of past days have drifted in this ice, and many have been in peril of their lives there. The worst disaster happened in June 1777, when about 28 whaling vessels were beset in the ice off the east coast farther north. Some of their number escaped during the months that followed, but twelve remained fast, and drifted southward down the coast.

On August 19th and 20th, six of these vessels were nipped and sank in Denmark Strait, not far from where we lay, between latitude 68° and $67\frac{1}{2}^{\circ}$ N. The others went on drifting southward, but in the end they were all nipped and sank too.

Their crews escaped on to the ice, but most of them succumbed; they either froze to death, or drowned, or starved to death. About 155 men got away in the boats to the west coast of Greenland, but more than 320 lost their lives.

In 1869 the ship "Hansa" of "The Second German North Polar Expedition" was beset in the ice and crushed north of Denmark Strait, and her crew drifted southwestward for a whole winter on an ice-floe down the coast of Greenland, until they approached Cape Farewell in the spring and were able to embark in their boats and row to the Danish colonies on the southwest coast of Greenland.

We did not regale our men with these harrowing tales of suffering and disaster, but cracked jokes with them instead. If the worst came to the worst, we said, we would keep them going with the bear's meat we shot. And if the ship was nipped we would all make our way to the land and found a colony; there would always be plenty of food on this coast, what with polar-bears, seals, reindeer, perhaps a musk-ox or two, and reindeer-moss and other delicacies.

We discussed this plan at such length that I quite began to believe in it and wished we could carry it out. What a fine life it would be! Farther down the coast

there were some Eskimo, with whom of course we should be on the best of terms.

But I doubt if the sailor lads were as enthusiastic about the scheme as I was.

At any rate some of them were absorbed in more prosaic calculations; they were busily figuring out the value of a "sixteenth" on the basis of our catch to date.

Then word came from the crow's nest that three bears were in sight, and everybody cheered up in an instant; all our troubles were forgotten, and it did not take us long to get down on the ice with our rifles. The "Balloon" accompanied us again, and we started in the direction of the bears. These were said to be a she-bear and two cubs.

After a while we saw them, though they were so far away that we could only just distinguish them from the ice. Evidently their senses were as keen as ours, for they had already discovered us, either by scent or sight. The wind was favorable, as it was blowing right towards them. Without more ado they came running at top speed straight in our direction. We took up our usual position, the three of us lying side by side on a hummock while we watched this race of which we were to be the prize.

Sometimes they ran in open order, at other times close together, according to the nature of the ice; now one would be in front, now another, now they were in the water because the channels were too wide to jump, and now they were back again on the ice; they were coming on very fast, and easily crossed the big, flat floes.

One of the cubs began to outrun the others, and was almost within range while the mother and the other cub were still about three hundred yards behind.

We did not thank it for this, as we feared we might be compelled to shoot it before the others came within gunshot; but we made up our minds to wait as long as possible.

I was to look after the cub, while the captain would deal with its mother.

Now the cub had reached the floe in front of us. On it ran as fast as ever until it was only fifteen paces away. Here it stopped, had a good look at us, crouched like a cat, and crept stealthily forward. It approached to twelve—ten—eight paces. . . .

I levelled my rifle, with my finger on the trigger, and watched every movement of the cub; glancing now and then at the mother to see how near she was getting. Now the young bear had approached quite close to the muzzle of the captain's rifle, while he was intently following the movements of the mother. It stopped and braced its muscles for a spring. . . . Crack! the bullet struck it full in the chest, and down it rolled from the hummock mortally wounded. Seeing it fall, the mother quickened her headlong pace still more, only to receive the captain's shot at the same moment and drop full length on the ice.

The cub had risen shakily to its feet, but a bullet through its back pierced its heart and killed it.

Meanwhile the captain had brought down the second cub with a bullet fired at long range.

The she-bear struggled to her feet, but was hit by a bullet from each of us and fell to rise no more.

As for the third bear, it had risen and was running away; a bullet from my rifle bowled it over, but with a roar it was up again, ran on, saluted by a couple of misses, and escaped out of range. I soon caught it up, however, in a patch of water, and made an end of it; after which it was hauled out on to the ice and back to its companions. We laid the three of them side by side.

The she-bear was not a very large one, being $6\frac{1}{2}$ feet from nose to tail. But the cubs were pretty big, one of them being 5 ft. $3\frac{1}{2}$ in. and the other 5 ft. 3 in. long. Evidently they were the previous year's litter and were about a year and a half old.

By this time the fog had closed in again, so we could no longer see the ship. We sent the "Balloon" to fetch some of the hands, who soon turned up and started to haul the bears home.

On the way back I found a long, slimy, greenish-brown mass of what looked like duck-weed, floating in the water between the floes. It was an alga (*Melosira*), and this was not the first time that I had noticed lumps of it in the water here among the ice. I discovered a large quantity of the same alga-slime in the stomach of one of the bears I shot, so it would seem that bears are in the habit of eating it as vegetable food.

Roast cub-steak and tasty bear's tongues made a welcome addition to our menu for some time after this. We thought the bear's meat, especially that of the cubs,

was excellent; but strange to say many of the sailormen forward refused to touch it; obviously in their opinion animals with claws were not fit for human consumption, and there was also the old superstition that their flesh was poisonous.

The power of imagination is extraordinary, as our skipper once found in the case of a mate he had on the "Magdalena".

They had shot a bear, but the mate could not eat bears' meat. While they sat at breakfast the captain told the steward that he must make some really good bear rissoles for dinner so that the mate might taste how nice they were. Afterwards he told the steward privately to make these rissoles for dinner out of the fresh beef that was hanging in the rigging; he could make some bear's meat rissoles for supper instead. Only he must not breathe a word to the mate about this.

When dinner time came the most delicious, juicy rissoles made of beef and pork were brought in, and the captain ate heartily of them; the mate would not touch them, but sat with a long face eating potatoes and ship-biscuit, and said the smell of the rissoles was enough for him. The skipper winked at the steward and expressed his concern at the mate's lack of appetite. He said they must have some beef rissoles for supper, and then it would not be their fault at any rate if the mate starved himself.

In due course supper arrived, and likewise the meat rissoles, which were made in exactly the same way out of meat and pork. The mate set to work to make

up for lost time. Helping after helping disappeared, and his appetite was quite amazing now. This was clean food, he said; not like those beastly bear rissoles that you could smell a hundred miles off. The captain was in ecstasies.

At length the mate, having reached the end of his tether, sat back in his chair full and happy, singing the praise of the steward's rissoles.

Thereupon the skipper asked him: "Are you quite sure that you have been eating beef-rissoles?"

The mate had no doubts on that score; but just then he caught a glimpse of the steward's face grinning in the doorway.

"You don't mean to say . . .?"

While the skipper and the steward laughed till their sides ached, the mate bolted out of the cabin door, and up the companion ladder on to the deck, where he got rid of all his supper over the side.

XV

STILL BESET. MORE BEARS

ON *Friday, July 7th* ($37\frac{1}{2}^{\circ}$, gentle breeze from WNW) we obtained altitudes which determined the position of the ship as $66^{\circ} 50'$ N. and 32° W. This meant that we were drifting westward straight towards the land, and at an increased rate too, for if the longitude was correct, we had travelled about 24 miles since July 4th, which was equivalent to a good 8 miles every twenty-four hours. We were much nearer to the coast now.

A big bonfire of old bear's flesh was made out on the ice, and this liberally fed with blubber, was kept burning for several days in the hope that bears would be attracted by the smell. They will scent the appetizing odor many miles off if the wind is blowing in their direction.

The ruse worked well, for in all about twenty bears were sighted from the crow's nest during the next few days. Many of these were comparatively far away, and of course we could not know whether there were twenty *different* bears; probably there were not, but even so it gave one an idea of the large number of these animals inhabiting this region.

In the evening of July 7th, the captain, who was looking through the telescope in the crow's nest, noticed a bear about ten miles away. To go all that way in chase of it was of course out of the question; the most one could do was to try to keep it in view.

Next morning, *July 8th*, ($37\frac{1}{2}^{\circ}$, light wind from NW) we were roused out to hunt a bear which had been sighted ahead of the ship. We set off in pursuit, but failed to catch it, which had not happened before. The animal ran away so fast that we could not get near; probably it had taken fright at all the rust chipping and scraping on board, which was going on now with such vigor that you couldn't hear yourself speak even at a distance.

Returning on board in a bad humor we sought consolation in reading our beloved "Ut mine Stromtid." The description there given of the vulgar "Pomuchelskopp" caught the captain's fancy so much that after this fiasco with the runaway bear he adopted it as a convenient appellation for the whole race of bears.

But we were soon interrupted; another bear was reported to windward. It was a long way off, however, and was moving up-wind, so we thought it useless to go in pursuit.

Very soon after this the second mate, Oran, caught sight of a she-bear accompanied by two small cubs, again on the windward side. We started off, but our luck seemed to have deserted us altogether. They were so far off, and were moving up-wind so rapidly that we could not hope to overtake them, and had to return empty-handed.

It was quite remarkable to see how the she-bear looked after her cubs, in her anxiety to get them along quickly. She helped them from floe to floe, now running ahead to entice them after her, now going behind to drive them on or push them along with her head applied to their hind quarters.

Soon after this I was back on board and engaged in testing some new bullets for my express rifle. I had extracted the copper tube from the ordinary bullets and in its stead had inserted a solid iron plug which completely filled the hole. Before long word came from the crow's nest that a bear was in sight to leeward. This sounded more hopeful, for once it was on our lee its fate was practically sealed.

As usual it was coming along up-wind, and the captain and I set out again for the third time that day. We kept well to windward of the animal, and as the going on the ice was good we were not very long in getting near.

The bear had stopped by a dead seal that had lain there since our last slaughter, and so busy with this that it did not notice us until we were fairly close. But it wasted no time about coming then.

We threw ourselves down on the ice. The bear went on running until it was about fifty yards away; but here it stopped, hesitated, and turned aside behind a hummock; then it came stealing out again like a cat, and suddenly gathered itself together and made a dash at us.

The captain was to have first shot. Crack! The

bear rolled over and lay motionless—none too soon either, for it was only ten yards away.

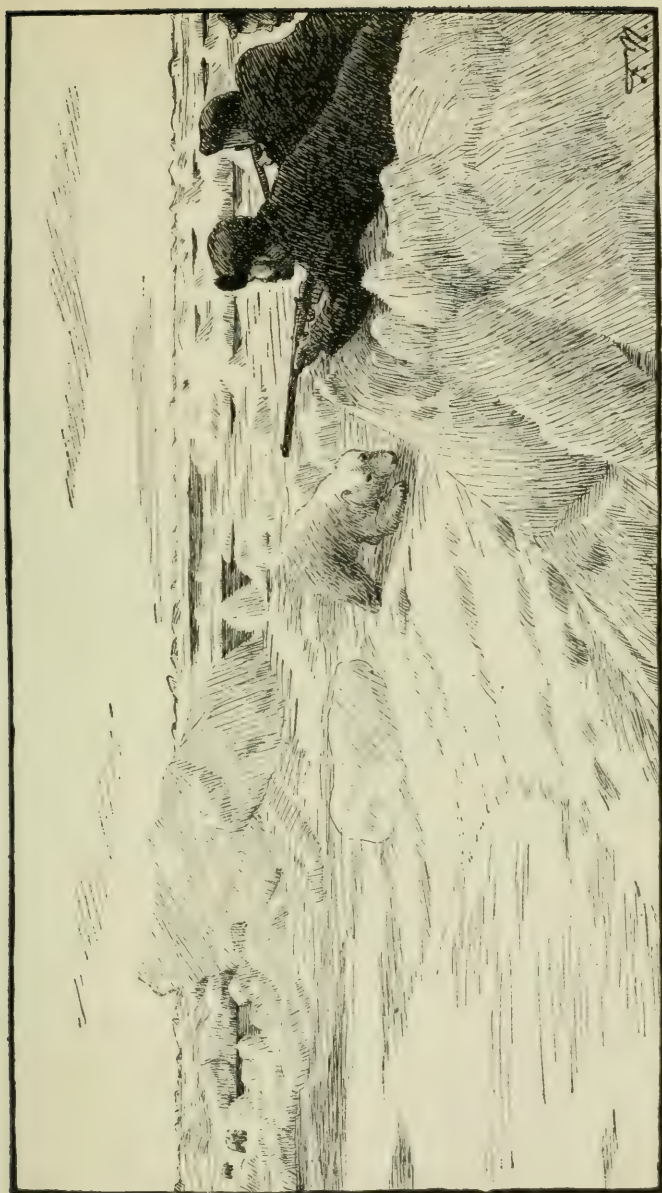
But it soon revived again; the bullet had merely grazed its skull and passed along the vertebrae of the neck into its spine. Its fore-legs were paralyzed. I fired a couple of my bullets into the animal, but it was quite unusually tenacious of life and would not die until I stuck my penknife (for lack of a better weapon) into its heart.

My bullets had gone right through its chest; they seemed to have done their work well, and had not burst too soon. But I was still of the opinion that solid bullets would have been more effective.

On our way back to the ship we discussed a favorite topic: how long ought one to wait before firing. The cartridge might miss fire, and then where should we be? We agreed that it was foolhardy to wait too long, and promised—as usual—to be more prudent next time. This, however, was easier said than done, and next time we had a bear within range the excitement of seeing what it would do again proved too strong for us.

It was now getting on for morning on *Sunday, July 9th*. We had not been long on board before a bear was reported to windward, but too far away to be hunted. This was the seventh in twenty-four hours. We stoked up the bears' bonfire well, and then turned in.

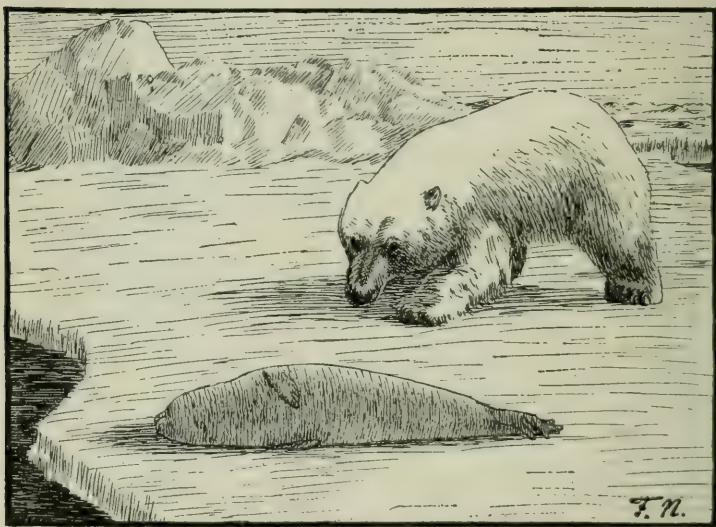
During the morning watch, at about four or five o'clock, Hans Halvorsen saw two bears, but these were also in the far distance.



"The captain was to have first shot."

Later, just as the captain and I had turned out, another bear was reported; and this time it was near enough for us to see it with the naked eye.

We set out in pursuit. But the bear was moving swiftly up-wind; as the captain put it "the fellow's good at sailing close-hauled; he's not more than a point off the wind, and if he's pressed he'll take that too."



"It stopped to inspect a dead seal."

Luckily it stopped to inspect a dead seal, and this gave us time to work round to windward and approach it from that quarter.

All these old carcasses of seals scattered about on the ice after our last fall were quite a help. Probably their presence was to some extent responsible for attracting so many bears to this part of the ice-field; at all events it helped to detain them, and prevented them from running away so quickly.

The bear was so absorbed in its find that it did not notice us until we had come fairly near. And of course we did not want to fire before it had seen us.

But now it raised its head, caught sight of us, and came lumbering towards us. We threw ourselves down on the ice. The bear disappeared behind a hummock right in front of us, and for a moment or two we saw no more of it. But we kept our eyes open, for if it reappeared on the top of the hummock it might be upon us almost before we knew.

Sure enough, the end of its muzzle appeared in a gap in the ice, followed by a little more, and then by its whole chest.

We fired simultaneously. The captain aimed right in the middle of the chest, whilst I shot at its head by way of a change, my bullet going in at its mouth and out at the back of its neck. Down it rolled, then struggled on to its legs again and scrambled away, looking over its shoulder with blazing eyes and the blood streaming from its mouth.

Two shots rang out once more. Both bullets hit the bear in the side, and it fell; but as it was still moving the captain gave it a final bullet. We did not want to economize in bullets as long as there was life in the animal—the least we could do was to put it out of its misery at once; and these creatures were certainly very tenacious of life. This time we had killed another large *he-bear*.

On our coming on board we were greeted with the news that the look-out in the crow's nest could see a bear about three miles away, but it was going up-wind

away from us to the north. As the carpenter and one or two others were very keen on trying their hand at bear-shooting, they were allowed to go in pursuit.

Times and standards change. The crews of the vessels that sailed the Arctic Seas of old did not regard the polar bear quite in the same way as our men. In the description of the Dutch expedition to the Kara Sea under Nay and Linschoten in 1595 we read how some of the men landed on September 6th near Jugor Strait, and were there attacked by a bear which killed two of their number. Thereupon thirty men armed with muskets, cutlasses and halberds came to the rescue; a battle ensued, and finally the bear was forced "to bite the dust." It was then skinned, and the skin was taken in triumph to Amsterdam.

When the Dutch under Rijp and Barentsz discovered Bear Island in 1596 they came upon a large bear there which took to the water. They rowed after it, but did not dare to try conclusions with it before they had received reinforcements. Then with two boats and a number of men armed with muskets, "harquebuses," halberds and axes they began a regular naval engagement against the animal which lasted two hours and was finally brought to a close by a blow on the head from an axe which killed the bear. It was skinned, and the skin proved to be twelve feet long.

Apparently the ferocity of the bears, as well as the size of their skins, was greater in those days.

It was in commemoration of the latter bear that the island received its name of Beeren Eylant.

According to the altitudes we now obtained, the

ship's position was $66^{\circ} 51' N.$ and $32^{\circ} 18' W.$ We had thus continued to drift westward during the two days since we had taken our last observations on July 7th, and had even moved one minute farther to the north notwithstanding the wind, which though quite light had been northwesterly or northerly all the time. But the drift had become much slower again, being only seven miles in the forty-eight hours.

The distance from the coast could not be more than half of what it had been when first we sighted land; we could see the mountains and valleys quite clearly now, even from the deck; it could hardly be more than twenty-five or thirty miles away, and one might walk there were it not for the risk of going so far away from the ship.

After the lapse of several hours the carpenter and the other lads returned. They had not seen any bears, but they had made a remarkable discovery, for they had seen open water close to the land. The carpenter was so sure that he was willing to bet on it; he had even seen the reflection of the mountains in the sea.

The captain tried to explain that what he had seen could only be a mirage, a phenomenon not at all unusual in this region. For it was obvious that if this open water had been visible from the ice-hummocks it would have been still easily seen from our crow's nest.

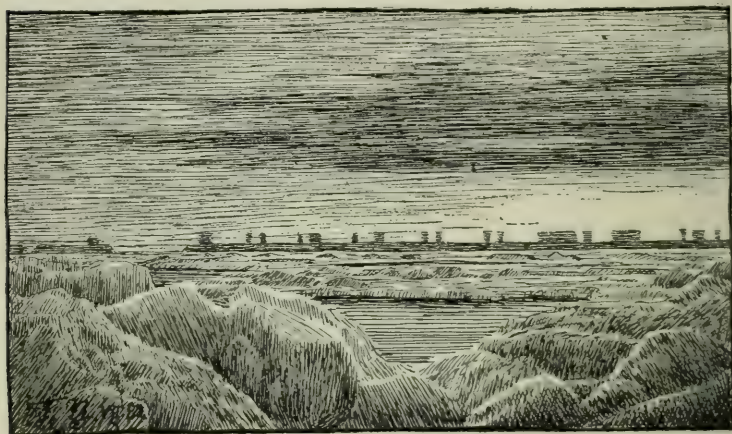
But it was not use. They stuck to their guns: what they had seen was open water, and the reflection of the mountains in it too.

It is rather curious to think that this is exactly the illusion that so often disappoints travellers in the desert

—the *fata morgana*—with a reflection of tall objects in water, the sight of which fills the thirsty wanderer in the desert with unspeakable joy.

In both cases the effect is produced by “total reflection” of the light rays at the level of transition from the dense cold layer of air to an underlying warmer and thinner layer, as I have elsewhere explained.

In the desert it takes place above the hot dry sand, while here it is above the cold ice-floes; in both cases



The mountain-peaks on the east coast of Greenland “lifted up”
by the mirage.

a warmer layer of air is formed next to the sand or ice by the action of the sun’s rays.

But there is also a kind of reversed reflection when hummocks and ships appear upside down in the air. In the evening and at night when the sun is low, the surface of the ice is cooled by radiation of heat and a cold layer of air forms above it. Light-rays from objects which are lower than this layer will then be re-

flected at the level where it borders on the layer of warmer air; the "roof" of the cold layer acts as a mirror, and if one is standing underneath this one can see an inverted picture in the air of objects which are at a distance. If the layer of air is so high that it reaches above the rigging of a ship, and one is standing at a distance, one can see the inverted picture of the ship standing on its head above itself. The distant ice-hummocks may often be seen with similarly inverted reflections over them. If there is any movement in the air these images will continually undulate and change their forms, producing an effect resembling a rough sea or vapor rising from ice in the far distance.

This mirage would often play the most extraordinary pranks with the mountains peaks along the coast of Greenland. They would have inverted summits above them, which swayed from side to side giving the impression of smoking volcanoes. At other times they would be lifted up to the horizontal boundary of the layer of air, when the mountains would assume the appearance of battlements on a castle with square embrasures.

The sailor-men had not been long on board before a bear came prowling along from the very direction they had been in.

It goes without saying that the other lads chaffed them unmercifully, especially one of the gunners, who had come back after the others, and used to think a great deal of himself.

"Of course there's a world o' difference between you and the skipper and N., for instead of your going for

the bear the bear goes for you. But why the dickens didn't you shoot it, lad?"

He was beside himself with vexation, all the more so because he couldn't think of any adequate retort. However, we started off without further delay and two of the hands were allowed to accompany us. As we went along I climbed a tall hummock to see which was the best way over the ice, and in so doing caught sight of the head of the bear above the edge of a piece of ice a long way off. It disappeared again and I came to the conclusion that it must be lying there. We walked on in that direction, and after a time went ahead of the two sailors lest the bear should be frightened by seeing so many of us.

We were getting near, and had just arrived at a big floe; while we were wondering which hummock was the one behind which I had seen the bear, its head suddenly rose above a ridge of ice not 30 paces away from us. We dropped full length on the ice as abruptly as though we had been shot; but the bear was just as quick, and advanced upon us snarling and showing its white teeth. Its movements had something of the feline cruelty of a tiger's. There was no doubt whatever of its evil intentions, and we had not many seconds to waste. It turned aside slightly thereby exposing its flank, and we both fired at the same instant. The captain's bullet entered its chest, and mine passed through its neck just behind the ear. It was as if the flame of life had been blown out in the middle of a step forward; the animal collapsed and lay motionless.

A shot through the neck vertebra has an instan-

taneously paralyzing effect upon the nervous system of any animal. It was fortunate that it had in the present case, for I cannot remember shooting any bear that was more determined in attacking. We had "bagged" another large, handsome he-bear. So heavy too, that when we wanted to turn the carcass over to look at the wound we only just managed to do so, though we were neither of us weaklings. As it lay there on the ice it measured close on ten feet from the nose to the extremity of the hind legs. I found that its blood-temperature was 101.3° , which is considerably above the normal temperature of human beings and also above the temperature of seals that I had taken.

Presently the men came and hauled the bear to the ship, while the captain and I strolled leisurely back.

It was a beautiful night. The sun was glowing above the rim of the ice in the north, and the northern sky was a perfect orgy of gold and purple hues. The whole vault of heaven was bathed in color shading off into a delicate mauve in the east and south. And underneath this stretched the endless plain of ice with all its hummocks and heaps, interspersed with shining pools and channels, right across to Greenland.

As I sat astride a piece of ice, lost in the contemplation of this gorgeous color effect and following with my eyes the contours of the mountains on land, I was awakened from my dreams by the captain's voice reminding me rather drily that my photographic plates were "hungry and thirsting" for me on board. We walked on towards the ship, but my plates were des-

tined to go on "thirsting" for a while, for on drawing nearer we saw that the lookout in the crow's nest was waving to us and we hurried on board. There we learned that three bears were close by to leeward. We set off again, and soon spotted them from a hummock. It was a she-bear with two small cubs, possibly the same that we had seen on Sunday.

We went on towards them, but they caught sight of us. We lay down on the ice; but after having a good look at us the she-bear made off quietly, together with her cubs. Seeing this we ran to the next high hummock hoping that from there we could get a shot at them; the distance, however, was too great and they were moving too rapidly. They were too fleet of foot for us to catch up to them. When she has quite small cubs the she-bear is loth to attack, and usually runs away as soon as she sees people coming. There was nothing for it but to go back on board and turn in.

Next day, *Monday, July 10th*, I went on a long expedition across the ice to an iceberg that we had noticed. We reckoned that our position was $66^{\circ} 50'$ N. and $32^{\circ} 20'$ W. (39° , wind from NNE).

It will be remembered that on first sighting the east coast of Greenland in July we saw several large icebergs lying in the drift-ice; either they were standing on the bottom or else were drifting quite differently from the rest of the ice-field, for we gradually approached them.

When I looked at these icebergs through the telescope I could see on several of them dark spots which I took to be stones that they had carried with them

from the land. One iceberg in particular was so dark that on first noticing it one morning I thought it was an island. It rose above the surrounding ice like a sombre crag. Every day brought this iceberg nearer, and before long I could clearly distinguish through the telescope large and small stones, and layer of gravel upon it.

I wanted to go and see this iceberg, but it was still too far away; the captain thought it would be unwise to go so far from the ship, even if the ice was fairly easy to traverse, for one never knew when a fog might come on.



The iceberg visited on July 10th, 1882.

But we drew nearer and nearer to the iceberg, and on July 10th it was not much more than four miles distant. I felt I must really go and have a look at it. The weather was fine (39°) with a light breeze from the north-north-east, and fairly clear.

Taking two of the crew with me I started off. The ice was for the most part easy to cross and when the channel between the floes were too wide to jump we made use of our seal-clubs to arrange a few smaller

floes in between as "stepping stones". We reached our goal without any incidents.

The iceberg was of very considerable circumference, with a peak about 100 or 130 feet high. On one side this peak was very sheer, with an area of low uneven ice at its base; on another side was a large fairly flat surface, with a number of big and little stones scattered over it which sloped gradually downward to the edge of the iceberg. On the third side was a lower portion of very considerable extent, rough and jagged with big mounds and pinnacles of ice. Here and there in the depressions on this lower portion of the iceberg lay quite a large accumulation of stones and gravel.

A fairly large area at the foot of the precipitous side of the peak was covered with stones and gravel, which looked rather like a scree. Moreover there were large and small stones embedded in the wall of ice above. It looked as though the scree below had been formed by stones and gravel which had originally been embedded in the ice but had fallen down from time to time as the sun melted the face of the ice.

Some of the stones lying on this iceberg were so large that one could scarcely lift them.

The amount of stone and gravel which was thus being transported over the sea was very considerable—that which we saw would at least have made several cart-loads, and there was probably a good deal more still enclosed in the ice.

It was no easy matter to climb the peak, for the sides were almost everywhere steep, and the ice was pretty hard and slippery. We hung on by our hands and

feet, however, and at length reached the top, where we hoped to have a good view. . . . But there came the fog rolling up from the north-east. We were more than four miles from the ship and it was no joke to go in a fog across ice like this; the sooner we started homeward the better.

When I reached the foot of the berg, I gathered a few stones as a keepsake, drew a hurried sketch of the iceberg; but before I had finished it the fog and sleet were upon us.

We made our way back as best we could; luckily the fog did not last long and we arrived at the ship without any mishaps; but the captain was relieved to have us safely on board again.

The stones that I had brought with me were not without interest, for very few had up to then been found on drifting icebergs.

I gave them subsequently to Professor Th. Kierulf, and some of them were examined under the microscope by his pupil Mr. M. Otto Hermann.¹

The stones were mainly pieces of volcanic rock: two kinds of finely granulated diorite, a couple of bits of an amygdaloid, an epidotic stone, and in addition to these a bright brick-red piece of sandstone.

These stones obviously come from the east coast of Greenland farther to the north, where the iceberg had broken away from the glacier. The most probable hypothesis seems to be that they were originally embedded in the lower layers of the glacial ice and had

¹Vide M. Otto Hermann: *Beschreibung von grönländischen Gesteinen*. Nyt Magasin for Naturvidenskaberne, Vol. 28, Kristiania 1884.

been torn away by the moving ice from the rocky floor of the glacier or from the rocks at either side of it; for all we know they may have come from the unexplored interior of the country.

There has been much disagreement among geologists as to whether the icebergs that drift about in the sea can really transport sufficiently large quantities of stone and gravel to make it probable that they played an important part in bygone ages in forming deposits and banks at the bottom of the sea.

What we saw on this occasion shows that some icebergs, at any rate, may carry considerable quantities of stone. And when the iceberg melts, or capsizes, the stones and gravel on them will in due course sink and lie at the bottom of the sea. If we suppose that numerous icebergs carry away a load of stones like this every year, a considerable amount of material must be removed in course of time, and a large quantity of stone will thus be distributed over the bottom of the Atlantic Ocean in the regions where icebergs have drifted and melted. In the ocean deposits of earlier periods we sometimes meet with large stones which in all probability have come from similar icebergs which were drifting about in the sea while these deposits were being formed.

On *July 11th* we had the most perfect weather with really warm sunshine. It was 43° in the shade, and there was hardly a breath of wind. I was lounging about the deck in slippers and shirt-sleeves, thinking about warm summer days at home in Norway, when all of a sudden I caught sight of a bear not far from the

ship. I hurried down to fetch the captain and we set off just as we were.

The bear was very busy with some old carcasses of seals which it was tearing to pieces with its teeth and claws. We could walk straight towards it across the big level floes without its noticing our approach.

Soon we were within gunshot, but waited for the animal to look round. However it only turned its back to us and shambled off.

We hastened after it and got within better range, but it still remained with its back to us and had not noticed us even now.

We whistled; at that time it looked round at last and turned its broadside to us. The captain fired, but all I heard from my rifle was first the crack of the percussion cap, then a hissing noise, then a report—and the bullet only made a hole in the air. The cartridge had been wet; I must have had it in my pocket some time when I had fallen into the water.

But where had the captain's bullet gone? The bear leaped round, ran some forty paces towards us, then stopped. I had just put in another cartridge and fired—again came the sound of the percussion cap, then the hissing noise and lastly the report. But all the same—the bear dropped dead!

We found that the captain's bullet had pierced both lungs and the heart, and it could only have been the crack of my rifle that did the rest, for there was not a bullet-hole anywhere else on the whole skin of the animal! What wonderful tenacity of life, to run forty paces after being shot through the heart!

This bear was shot in the middle of the day and was the only one we got at that time; on the other occasions they made their appearance in the evening or at night or towards morning.

We obtained some good altitudes that day, and found the position of the ship to be $66^{\circ} 38' N.$ and $32^{\circ} 32' W.$ The drift had changed its direction; it was now setting south-south-westward along the coast, and since the day before yesterday we had drifted about 14 miles in that direction—a good seven miles in the 24 hours. Did this mean that there would soon be a change in the ice-conditions? Apparently this alteration in the drift was not due to any change of the wind. No doubt there had been a light breeze from the north and north-east yesterday and the day before; but that there had been all during this month, and today it had almost dropped altogether.

We were about the same distance from the coast, namely about 20 or 30 miles, as I have said.

Every detail of the landscape there was clearly visible at sunset, except when the mirage rebuilt the land in all sorts of fantastic shapes.

It was a lovely clear evening, and I climbed up into the crow's nest to make a sketch of this unknown coast.

First of all, however, I carefully swept the ice in every direction with the telescope to make sure that there were no bears about. Then I set to work to draw.

Everything was quiet on deck; the men had turned in a long time ago; I could only see the "Balloon", whose watch it was, occasionally moving about on the deck.

For a long time I sat there absorbed in my work, first looking at the contours of the mountains and valleys through the telescope and then drawing them, and had quite forgotten where I was . . . when suddenly I heard the "Balloon" shout:

"Hi! Look at that bear."

I jumped up hastily and looked over the edge of the crow's nest. The "Balloon" was standing on the fore-castle pointing, and there sure enough stood a bear right under the bow of the ship. I threw aside my sketch-book and pencil, and was out of the crow's nest and down the gay-rope at such a rate that it nearly took the skin off my hands; then ran in to fetch my rifle and cartridges.

At the door of the cabin I met the captain, who had also heard the "Balloon". We seized our rifles and hurried off.

The bear had been startled by the "Balloon's" shout, and had sheered off. When we had gone a short distance we saw that there were two bears—the second one had been prowling near—and both of them were now jogging away from us.

Though the range was too long, we thought we might as well try a shot, for there seemed to be little chance of overtaking them. But our shots had only the effect of making them go faster, while we put our best foot forward in pursuit.

Presently the captain gave up; he was too heavily clad. But I was more lightly clad in gym-shoes and a sweater, and thought I could keep on for a bit longer.

On and on—over one big floe after another. They

were leaving me hopelessly behind; and when I saw that the ship's flag was being run up again and again as a signal for me to return, I had to give up too.

For a long time afterwards the captain's stock jest was this :

"A fine lad to have in the crow's nest, who couldn't see a bear when it was sitting right in front of the bow!"

The *12th of July* was the warmest day we had had, 46° at noon, without a breath of wind or a cloud in the sky; this really *was* summer.

We were southward bound now; our observations today showed that we were in $66^{\circ} 28' \text{ N.}$ and $32^{\circ} 35' \text{ W.}$ This meant a drift of ten miles straight towards the south in twenty-four hours. Unquestionably the direction of the drift had completely changed, and this could neither be due to the wind, for wind there was none, and the barometer remained continuously high.

On *Thursday, July 13th* we had the same beautiful weather, only still warmer, 50° at noon. An altitude gave us $66^{\circ} 20' \text{ N.}$ and the longitude was estimated to be about $32^{\circ} 40' \text{ W.}$ This showed that we had gone eight miles southward since the day before. A change was evidently at hand.

Next day (*July 14th*) it was almost as warm (48°), but there were indications of a break in the weather; there was a light breeze from the south-east and south-south-east, and it was thick and overcast.

I took the temperature of the water at various depths and obtained the following readings :

At the surface 34.3° ; in 10 fathoms 30.4° ; and in 20 fathoms 30.6° .

This gives an idea of the way in which the ice melts. The deeper, cold water is obviously Polar water which comes from the north with the ice and the current, and ice cannot melt in it to any extent because its temperature is only a degree or two above freezing-point. But on the top of this there is a thin layer, possibly half a fathom or a fathom deep, which in summer is warmed by the radiation of the sun to a temperature of 34° , or even 35° at the surface; and this layer largely consists down from the floes into the sea.

The warm water at the surface, which is constantly being further warmed up by the sun, has a strong action upon the edges of the floes at and a little under the surface of the sea, thawing them and eating far into the ice. In this way the floes get to have "tongues" which project in the water below the warmest layer of water at the surface. That portion of the edge of the ice which is above the sea projects over the water.

Meanwhile the warmth of the sun rapidly melts away the surface of the floes and the ridges and hummocks upon them, and large quantities of water run down from the floes into thesea.

The effect of this is to make the floes lighter, and since little or none of the ice underneath is dissolved they necessarily rise in the water; the projecting edges are thus continually lifted higher and higher above the sea-level, as the weight on the top of the floes is reduced by the melting of their surface. While this process of melting is going on, the projecting edges are

gradually becoming thinner, and may prove a very treacherous foothold indeed when one is walking along over the floes without knowing that they are hollowed out underneath.

At length these projecting edges will often melt away altogether, while in the meantime the warm surface-water has eaten away the ice underneath, and the floes will then shelf downward into the water with their "tongues" jutting far out in it.

To traverse ice of this description may be rather troublesome work since the edges of the floes above the sea are kept far apart from one another by the contact of their projecting "tongues"; it may be necessary to wade across upon these in order to pass from one floe to another, unless one can find a piece of floating ice to use as a "stepping stone."

There seemed to be longer intervals between the bears now; we had not seen one since I sat in the crow's nest on the evening of the 11th. But at last, late in the afternoon, the lookout in the crow's nest reported a thumping big one not far away.

We went aloft to have a look at the ice and take our bearings properly, and then set off. Paul, one of the sailors, accompanied us.

We walked on for a long time, at least so it seemed to us, without seeing anything of the bear; this was certainly odd, for we ought long ago to have reached the place where we had seen it from the ship. But signals from the crow's nest indicated the direction in which we were to go, and in the end we caught sight of the animal.

Afterwards the mate who had been sitting up in the crow's nest told us that the bear had noticed us long before, but had gone on moving away from us. Being unaware of this we lay flat on a hummock to have a look at the creature, as was our custom. We might have fired, of course, but thought that it would come towards us in the usual way.

It was prowling to and fro, inspecting us from various points of view, evidently more suspicious than those we had previously tried to lure on; but for all that it was a splendid specimen of an animal.

Then it vanished behind a hummock; and when at length it reappeared it was far out of gunshot, retreating from us, and rapidly too.

There was nothing for it but to go in pursuit, so we set off at a run, seeking cover as far as possible behind the hummocks.

In my eagerness I forgot that the treacherous edges of the floes which project far out over the water and look so solid, are in reality quite thin.

I came to a wide lead which could just be jumped, and made a vigorous leap—but the whole edge of the floe broke off under my feet and I landed with a splash in the middle of the lead.

I threw my rifle up on the ice, but not high enough, and it slid down again. I just managed to catch it as it slid back into the water, hurled it well on to the floe this time, and swam to a place where the edge of the ice was low enough for me to climb up.

After a hasty inspection of the lock and barrel I ran on. The wetting wouldn't do any harm to the car-

tridges in my pocket; they had whole copper cases with rim-ignition and were well greased with tallow.

In the meantime the captain had got a good start. Seeing that I could get out of the lead without his help he had crossed it at an easier place and gone on.



"Swam to a place where the edge of the ice was low enough."

Fortunately I was again lightly clad in gym-shoes and a sweater without a coat, so my movements were not impeded by heavy waterlogged clothing. I soon caught up, and seeing the bear turn aside behind a hummock I cut across after it.

On sticking my head over the brow of the hummock I found myself face to face with the animal and instantly levelled my rifle, but Bruin was too quick for me and plunged into the water. The bullet only hit it in the hind quarters as it disappeared.

I jumped over the top and hurried to the edge to shoot it in the water; but the bear was not there. Then

I caught sight of a big white form struggling along far down in the blue depths; the lane was a long one, and the bear might come up anywhere; the best plan seemed to be to cross over to the big floe on the other side, and I thought I could manage this by jumping on to two pieces of ice which were floating conveniently in the middle of the lane.

With a long jump I landed on the first piece; it only just bore my weight, and while I was balancing in



"While I was balancing . . . up rose the huge head of the bear."

preparation for the next jump, up rose the huge head of the bear close beside the little piece of ice in front of me! The animal heaved itself half up on to this and now it was touch and go with me. I managed to steady myself sufficiently to level the rifle, and fired right into its chest, the smoke blackening all the sur-

rounding fur. It rolled off the piece of ice, but was not quite dead, and showed signs of sinking. I held it up by one ear, and very soon it was dead. This was the first time that I had seen a bear sinking; as a rule they are so fat at this time of year that they float.

The two others soon came to my assistance. The captain told me his heart stood still when he saw the bear rise just in front of me and I looked as if I could not recover my balance sufficiently to shoot; he had expected to see us both in the water the next minute, but he could not shoot because my legs were between him and the head of the bear.

We had nothing to haul the creature out with except my belt, and that was rather inadequate; however I fastened this round its neck and we pulled it along through the water to a creek in the ice-floe. Here there was no fear of its sinking, as it was lying on the projecting "tongue" of the floe; we could take it easy and draw the carcass up little by little. It was one of the largest bears we ever killed, and had numerous big scars where it had been wounded, doubtless in fight with other he-bears.

It was a long distance to the ship and we waited a good time for help to come. In the meantime we began to "hulk" it. But I was not allowed to help with this; for the captain said I was wet through and must go back to the ship and put on something dry.

This struck me as absurd, but I did as I was told all the same, and handing over my sheath-knife for him to open it up with, I set off obediently towards the ship.

Virtue hath its reward. When I drew near to the

ship I caught sight of three men a good bit away on the ice, and it seemed to me that two of them were carrying rifles. I wondered where they were off to, and on arriving on board I learned from the lookout that they had gone after a bear, but that I could not catch them up in time as they were already within gunshot of it. Oh well, I hadn't done so badly for today, thought I; they were welcome to their bear.

Then somebody said there were three bears. This was too much! I would gladly have let them have one, but if there were three surely it was only reasonable that one of them should fall to my share; so I set off again.

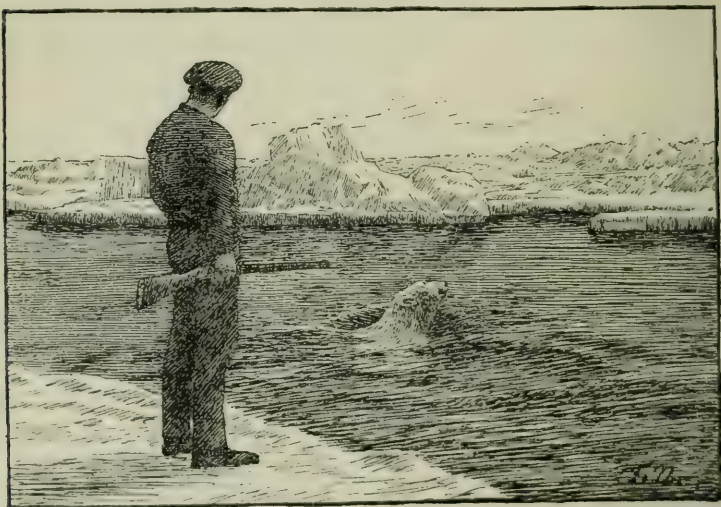
Being wet already, I did not think it worth while to go round many of the lanes; if they were too wide to jump but the floes projected under water, I waded across; and if not I swam over; so I did not waste much time.

Before long I caught up the others. They were just lying in wait for a bear which was coming straight towards them, and I sat down on a block of ice a little way behind so as not to disturb them. I saw one of the two who had rifles nudge the other and look over his shoulder at me; they were afraid that I would steal a march on them, and the outcome was that they shot too soon and only wounded the animal, which ran away.

Then I shot it in the chest and it fell, but got up again and ran on. I went in pursuit; whereupon it turned and made for me. Finally a bullet through the head dispatched it.

Now for the next! We saw the man in the crow's nest signalling, and going in the direction indicated we quickly caught sight of the bear eating an old carcass of a seal; it was so intent on this that we came well within gunshot and it did not notice our approach. I did not altogether rely on the others, and accordingly suggested that we should shoot from where we were, without going any nearer.

I whistled to get it to look up, but it would not. I whistled still more loudly, and this time it raised its



"I allowed it to swim in safety across to the opposite side."

head. Aiming behind the shoulder I fired, and the other two shot at the same instant. The bear gave a roar and toppled over into the water. I ran to the edge, and thinking it had had enough I allowed it to swim in safety across to the opposite side; when it climbed up on the ice I would give it the *coup de grace*,

while at the same time saving all the trouble of hauling it out of the water.

But on this occasion I was badly out in my reckoning, for the bear saw his chance and swam behind a hummock; under cover of this it leaped on to the ice with the litheness of a cat and hurried on. I felt thoroughly sold, and could only send an impotent shot after it.

Thereupon I started in hot pursuit. Oluf Holmes-tranding, who had no rifle but only a seal-club and a rope, accompanied me a little way, but was left behind at the first lane that was too wide to jump, while I plunged into the water and swam across.

Oluf laughed at this novel method. He thought he would "go one better," pushed a small floe into the middle with his seal-club and stepped on to it. Now it was my turn to laugh, for only his arms and chest reached the farther side, while he sank up to the middle in the water. His high sea-boots filled, and took so much emptying that I had no time to wait. Oluf shouted lustily to me not to leave him, for he had no rifle and didn't dare to be alone on the ice with so many bears about. But I only laughed and ran on.

On we went over the ice; now I would gain on the bear, now it would draw away from me. I discovered afterwards that my bullet had actually hit it right enough behind the shoulder, but by mistake I had taken one of the cartridges with hollow bullets that I used for seal-shooting, and this had only made a large surface-wound which did not seem to hamper the animal much. On the other hand it was bleeding, and the track was

easy to follow even when the bear was out of sight behind the hummocks.

In this way we sped on across floe after floe. When the bear came to lanes that it could not jump it had to swim, and at such times I often gained a good deal. But when I reached the lane I had to swim too, and then the bear increased the distance between us again.

I had only two cartridges left, so I would not fire before getting within easy range, especially as running like this was not too good for the steadiness of one's hand.

We ran on mile after mile, and still the animal was going strong. But when we had done four or five miles it began to zig-zag, enabling me to cut across, which helped a good deal.

Evidently the animal was getting tired, so I began to slacken speed a little. It disappeared behind a hummock, and under cover of this I put on a spurt; but the bear had detected the ruse and spurred too.

It went on at a good pace for a short way; then it slowed down afresh.

At last I was within range, and sent a bullet through its chest. It gave one or two bounds and then fell. A bullet behind the ear put an end to its sufferings—and this was my last bullet.

So there I stood with the dead bear; and the only weapon I had was a penknife, for I had given my sheath-knife to the captain.

The first thing to do was to signal to the ship for assistance. I could only see her masts above the ice, but I climbed on to the largest hummock I could find

and waved my cap on the end of my gun-barrel. Next I started skinning the bear with my penknife. It was slow work, especially as the head and paws had to be cut off with the skin in the usual way.

But with care and patience I managed it, and had just finished when I heard a distant shout. I climbed a hummock to see what it was, and it turned out to be Oluf, who had been following the tracks. He had been running for all he was worth for fear of meeting the bear, and was highly relieved to find me. His only weapons consisted of a seal-club, a skinning knife and a packet of cartridges.

We harnessed ourselves to the skin by Oluf's rope and set off homeward with it; but a large skin like this with a thick layer of blubber adhering to it is no light weight and is surprisingly difficult to pull along over the ice.

Before we had gone far we met the men who had come to help us, and we gladly handed the skin over to them, as well as the rifle, and Oluf's cartridges so that they could defend themselves if another bear turned up.

Oluf and I thought we had done our share and walked on ahead.

On the way back he was full of my new method of negotiating the lanes, and the incident when he was left alone with his waterlogged boots, had evidently made a deep impression upon him.

Presently we met a messenger from the captain bringing us beer and food. We were quite touched by

such thoughtfulness and thoroughly we enjoyed the meal too, especially the beer after all our exertions.

They had watched the whole race with the bear, and seen me swimming across the lanes, through the telescope up in the crow's nest; I did not hear the last of it for some time to come.

We learned on our return that the third bear had been close to the place where we had met with the one killed last; it had taken itself off now, however, so there was nothing to be gained by going in pursuit.

It was a pity we couldn't have shot that one as well, for it would have just completed the score; as it was, we had bagged nineteen bears.

This was our last bear-hunt.

Next day, *Saturday, July 15th*, the weather was much the same, but the wind was blowing from the west; it was overcast and rather foggy, so we could not see much.

We had evidently drifted a good deal farther to the south; apparently we were not drifting much now, but the ice showed signs of becoming looser—already there were several open lanes near us.

On *Sunday, July 16th*, we did not seem to be drifting much either. According to a subsequent reckoning our position was approximately 66° N. and $33^{\circ} 5'$ W. The same thick, foggy weather prevailed, but the wind had gone round to the north-east and north. The ice was loosening still more, but we could not yet see open water in any direction.

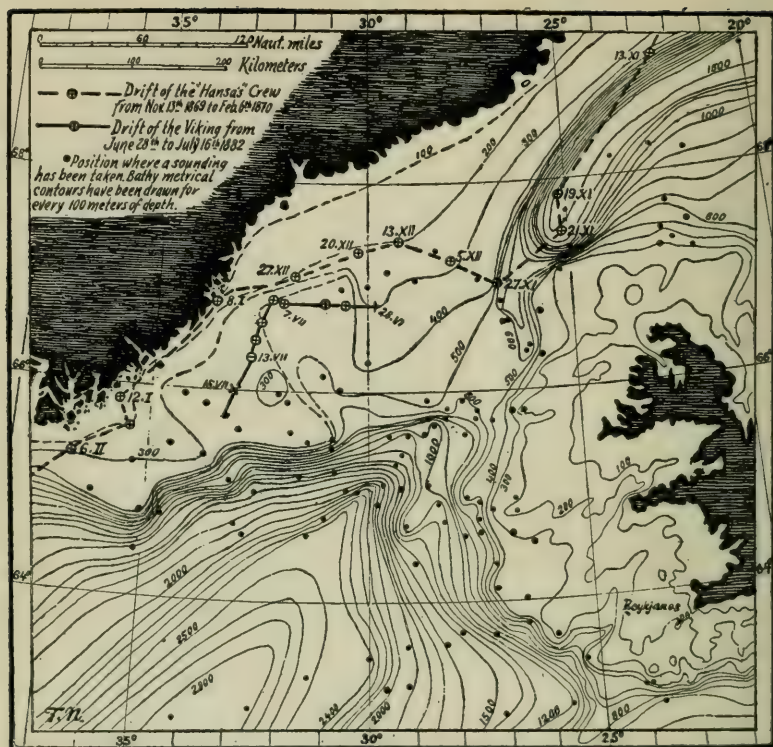
XVI

THE DRIFT OF THE ICE, AND THE CURRENTS IN DENMARK STRAIT

THE course of our drift had been a curious one: during the first fortnight that we were held fast, namely from June 25th. to July 9th. we drifted with steadily increasing speed in a direction between west-north-west and west towards the land, and then without the intervention of any noticeable external cause, this progress came to an abrupt end, and our direction changed to south-south-west and south at a higher rate of speed. The slight wind that we experienced in among the ice during this time cannot have been the cause of the drifting, much less of the sudden change of direction around July 10th.

During the twelve days westerly drift, from June 27th. to July 9th. the wind was quite light, mostly from true north-east and north. If the strength of the wind be denoted in figures from 1 for "light breeze" to 6 for "hurricane," the force during this period would for the most part have been 1.

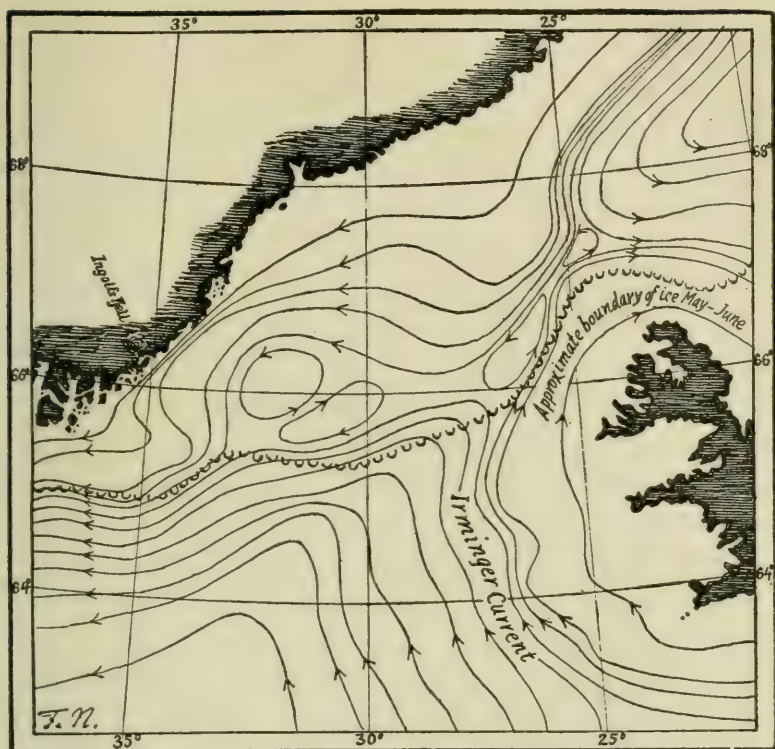
The average wind direction during these twelve days was north 9° east, and the average force of the wind in that direction was 1.2° .



The drift of the "Viking" and the "Hansa" in Denmark Strait.

On the map, page 448, the direction and strength of this average wind are denoted by an arrow. It will be observed that the course of the wind was approximately at right angles to our drift.

During the seven days from July 10th. to 16th. when the drift was in a southerly direction, and at a higher speed than when it bore westwards, the wind was still lighter than before, and for several days there was practically a calm. The direction of the average wind at this time was North 20° East, and the strength



Probable currents in Denmark Strait.

0.4. It is indicated by a short arrow on the map. It is impossible that this wind can have been the cause of the change in the drift.

That the wind had a very different direction and force nearer the outer edge of the ice and open water, which could account for our drift, is not probable, and does not appear from the journal of the ship "Morgen," which I have had the opportunity of examining. This vessel remained at this time near the edge of the ice. Nor was there out there any sudden alteration

in the wind conditions which might explain the change in the drift; such an alteration would also have affected the wind farther in where we were, but the barometer kept remarkably steady and set fair during this time. Out by the edge of the ice there was, for example, a calm on the 12th. and 13th. of July, and there was also a calm with us.

We must therefore suppose that our drift with the ice and its alterations of course were not directly due to the wind, but to currents in the water, which a little south of Lat. 67° North first caused the ice to move slowly west-north-west and west towards the land, and then, near the coast, turned away southward.

It is a striking fact that we drifted shoreward towards exactly the same place on the east coast of Greenland as that where the men of the "Hansa" almost drifted ashore on the ice-floe after New Year 1870, and which they called "The Bay of Horrors," on account of their terrible experiences there.

It can hardly be an accident that both the men of the "Hansa" and we should have drifted shoreward at exactly this spot, and that the drifting should have been remarkably slow in both cases.

On the charts, pages 448 and 442, the drift of the "Hansa's" men with the ice is marked.¹ The average

¹The determinations of position which were made during the drift do not agree with Amdrup's chart of the east coast of Greenland, made between 1898 and 1900, in that this drift is shown to lead right on to the land at the "Bay of Horrors," and further south by Leiv's Island. The "Hansa's" men's chronometer must have altered its timekeeping during the drift on the ice-floe, so that by New Year 1870 it was about $1\frac{1}{2}$ minutes slow, and thus gave about 25 minutes of longitude too far west. In my maps I have corrected the determinations of position during the drift in agreement herewith.

speed of this drift between the days when astronomical observations of position were taken, was:

From Nov. 5th. to Nov. 13th.	8	naut. miles per day towards	S.30°W.
From Nov. 13th. to Nov. 19th.	15.8	" " " " "	S.38°W.
From Nov. 19th. to Nov. 21st.	11.0	" " " " "	S. 4° E.
From Nov. 21st. to Nov. 27th.	8.6	" " " " "	S.49°W.
From Dec. 27th. to Dec. 5th.	4.4	" " " " "	N.56°W.
From Dec. 5th. to Dec. 13th.	4.0	" " " " "	N.65°W.
From Dec. 13th. to Dec. 20th.	3.5	" " " " "	S.75°W.
From Dec. 20th. to Dec. 27th.	5.0	" " " " "	S.69°W.
From Dec. 27th. to Jan. 8th.	4.1	" " " " "	S.63°W.
From Jan. 8th. to Jan. 12th.	19.0	" " " " "	S.43°W.
From Jan. 12th. to Jan. 18th.	3.0	" " " " "	S.18° E.
From Jan. 18th. to Feb. 6th.	1.9	" " " " "	S.63°W.
From Feb. 6th. to Feb. 16th.	8	" " " " "	S.58°W.

The observations of position for the 18th. January and 16th. February are for Latitude only ($65^{\circ} 35' N.$ and $64^{\circ} 34' N.$) but in addition the distance from land has been estimated at about 18 naut. miles for January 18th. and 10 miles for February 16th.

The "Viking's" drift was approximately:

From July 2nd. to July 9th.	5.9	naut. miles per day towards	N.86°W.
From July 9th. to July 11th.	4.7	" " " " "	S.24°W.
From July 11th. to July 12th.	10.0	" " " " "	S. 6°W.
From July 12th. to July 13th.	8.2	" " " " "	S.14°W.

There is a remarkable agreement between these two driftings; both are comparatively slow when the course is westerly towards the land, that of the "Viking" a trifle faster (5.9 miles per day) than that of the "Hansa's" men (averaging 4.1 miles per day), and then increase considerably in speed as the direction near to the land bears away to SW or SSW, when that of the Hansa's men reaches as much as 19 miles per day, while that of the Viking seems to be retarded at the turning point about July 10th., coming to full strength again towards SSW when it reaches 10 and 8.2 miles per day.

This agreement becomes still more striking, when it is remembered that the men of the *Hansa* were drifting in the middle of winter, and had strong winds and stormy weather, while our drift—the speed of which in a westward direction was somewhat greater than theirs—was during full summer, and only light breezes. It would appear to indicate that the currents in this region vary very little the whole year round, and are not to any important extent directly dependent on wind-conditions.

If we compare the drift of the *Hansa's* men, and its alterations of speed and direction with their records of wind-conditions, we find that although the former no doubt had a certain amount of direct effect on the variations of drift, this effect cannot, speaking generally, have been of decisive import.

Probably it is the currents with their complicated vortical movements, that mainly decide the drift of the ice with its numerous and apparently capricious shiftings in these regions. The directions taken by these currents and the variations of the same must be regarded as being largely dependent on the configuration and depths of the sea-floor.

On the basis of the soundings known in this district I have endeavored to draw a bathymetrical chart of the sea-floor of Denmark Strait. Unfortunately the soundings are few and far between on the Greenland side, so that the depth-curves cannot be drawn up with the accuracy that might be desired, and in the drawing I have had to depend largely on personal estimate; yet none the less they probably give an approximate pic-

ture of the extent of the banks, and of where the bottom dips sharply down to the great depths.

On this map I have also shown the drift of the "Hansa's" men and of the "Viking" with the ice.

We see that from the 13th. to the 19th. of November the drift of the Hansa's men practically followed the edge of the 1500 meters (800 fathom) deep furrow, in then north-eastern part of Denmark Strait which cuts from a north-easterly direction in between Iceland and Greenland. Here the drift has reached a high rate of speed, namely 15.8 naut. miles per day.

But as it approaches the end of this deep cutting, the drift decreases in speed to 11 miles a day from November 19th. to 21st., and the direction bends away towards the south, in all probability still following the edge of the furrow. This alteration in speed and direction may have been due to the fact that during these two days there was a fresh south-easterly breeze, that is to say a contrary breeze.

But then the sea grows suddenly shallower further to the south, and the speed of the drift is reduced to 8.6 miles per day from November 21st. to 27th., and its direction turns off to the west, so that during these days its average course is south-westerly. The wind cannot have been the cause of this reduced speed of drift, as it continued to blow from the north-east with about the same force as during the six days from November 13th. to 19th. According to the calculations made by Prof. V. Walfrid Ekman, the ocean currents in the northern hemisphere which move towards regions where the depth of the sea is less tend to turn



The course and drift of the "Viking" in the ice in Denmark Strait.

away to the right, while they turn away to the left wherever the depths are increasing, and this should be the case even where the depths are great. It is, a necessary proviso, of course, that there shall be room for the currents to turn away. In accordance with this theory the current in the present case, in which the ocean-bed is shallowing, should tend to bend away to the right.

After the 27th. November the drift turns still farther away to the right, and takes a west-north-westerly direction. The sea becomes still shallower; and it may have still farther assisted the westerly drift that there was a fresh easterly wind for four days, namely from November 29th. to December 2nd. But wind-conditions can give no explanation of the continued drift in a west-north-westerly and westerly direction after December 2nd.

It is probable that there is another and an important contributing factor to be considered in this district, and that is that the current meets the warm Irminger Current which flows northward along the ridge of the broad bank to the west of Iceland. As the sea grows shallower here below this northerly current—the latter should tend to bend away to the right; there is, however, little space for this, and only a minor arm of it flows towards north-east and east to the north of Iceland. A large part of the water of this current is compelled to turn off westward on the south side of the highest ridge in the strait, with a saddle depth of about 300 fathoms and from thence to the south-west along the banks off Greenland. On account of this the water

of the Polar Current is also forced to bend away westward near this same ridge, with the result that a powerful vortical movement is set up in this region. On the northern side of the latter the ice is drawn westward towards the banks near the coast of Greenland, and here the speed has to be comparatively slow, as the cold stream spreads itself out over a larger area, and moreover the water is checked in its course by the shallowing slopes of the bank; but near the coast the current contracts again, and the speed of drift along the coast towards south-west and south-south-west increases considerably.

Unfortunately we have very few soundings from the banks here. It is probable that the bottom is very uneven and furrowed by many submarine valleys and fjords, and has a surface similar to that of the land on that coast. I am inclined to think that the curves of depth for 200 and 300 meters, and possibly also for 400 meters for the most part, turn away here westward towards the land, to turn again south-westward and south when near the latter, finally bending away again out to sea farther south.

In this case the drift both of the *Hansa's* men and of ourselves followed the general direction of the edge of those banks which these depth curves demarcate.

After the men of the "*Hansa*" had drifted south-westward at a great speed (19 nautical miles per day) along the coast, and on January 12th., 1879 had come south of Lat. 66° N. a remarkable cessation of the drift took place, and the floe seems to have drifted slowly out to sea in a south-south-easterly direction

until January 18th, the speed being no more than 3 miles a day, in spite of the fact that during these six days there was a constant wind from the north-east with stormy weather, the wind being at least as strong as it had been on the two preceeding days. During the period that followed, up to February 6th. a strong northeasterly wind blew most of the time, this wind having the force of a gale for nine of these days, and during one night that of a hurricane. Notwithstanding this, the drift was a very slow one, west-south-westerly at a speed of 1.9 miles per day.

It is clear that in this case the wind had but little influence on the drift. This would appear to be the more remarkable in that during a storm on January 11th., the ice was heaving considerably, indicating that they were near open water.

According to the chart of the sea-bed it appears as though just south of 66° N. Lat. there stretches a bank with depths of less than 300 meters in a south-easterly direction, in which case this would naturally check the current and drive it out in a similar direction; and above this bank the transport of the water to the south and south-westward is very slow, with many local vortices, to which the strong tidal currents also contribute. Many icebergs were at rest on this bank presumably stranded there, and they may also have helped to check the drift of the ice to some extent.

Thus it seems reasonable to suppose that the current may drive the ice out towards the south-west over this bank, and that north of it there may well be a deep "bay" in the ice. This would agree with the fact

mentioned above that the Hansa's men experienced a powerful heaving in the ice on January 11th., proving that they were near open water.

It agrees also with the fact that during the voyage of the "Jason" in 1888, I found a deep bight in the ice at exactly the same spot in towards Ingolf Mountain.

During the drift of the men of the Hansa farther south along the east coast of Greenland there were several similar changes of direction, which are not to be explained as produced by the winds, but which one must also attribute to the configuration of the seabed.

On a basis of what we now know of the conditions in Denmark Strait, I have endeavored to draw a current-chart, on which the curves should denote the course and the relative strength of the current in the upper layers of the water (see page —). Where the curves run close together, the currents are comparatively strong, being weaker according as these curves widen out from each other.

It will be obvious that, with the imperfect knowledge that we still have as to the distribution of the various water-masses in this region, this chart must not be regarded as anything more than an attempt to give an approximate picture of the currents there.

XVII

HOMEWARD BOUND

THE ice loosened to such an extent on *July 16th.*, (35.6° to 45°, light NE and N wind) that there seemed to be a good chance of "getting a move on"; accordingly the boiler was lighted, and later on in the day the engine was started. We then began gradually to work our way through the lanes. Slow work it was, too, at first, but after a time the lanes became wider and there were long stretches of water which we navigated fairly easily. But so far there was no open water in sight anywhere.

We kept going all that evening and night, availing ourselves of every opportunity to push on towards the south-west, and from time to time we found larger leads and channels.

On *Monday, July 17th*, (32° to 45°, light N wind) the ice became looser still, and we made good progress. The weather cleared, too, enabling us to see from the crow's nest that there was open water to the south-east. At length, about midday, we glided out past the last of the floes.

It gave one a wonderful sense of relief to be once more out in the open sea and able to steer whichever

way one pleased—as though a weight had been lifted from the shoulders of every man on board; for there is nothing the Arctic voyager dislikes more than to be fast in the ice; and not without good reason.

But having regained our liberty, how should we use it? For it was too late now to begin hunting bladdernoses again. Hugging the edge of the ice we steered an eastward course until next day (*July 18th*); but we saw no sign of bladdernoses or ships. Most of the seals would have gone away by this time; and in any case they would be so thin, that they would scarcely be worth the trouble of catching.

No, there was a favorable wind from the north-north-east, and the best thing to do was to shape a course for home. Great was the joy on board when this decision was announced. There was no question now of economizing either sail or steam. Every stitch that would draw was set, the engine was worked at high pressure, and the “Viking” sped foaming along over the blue sea on a south-eastward course round the south coast of Iceland.

Everyone on board was in high spirits, not only because we had escaped from the ice, but also because we expected soon to be back in Norway. It had all been so abrupt and unexpected. Only two days ago we had been lying immovably fast in the ice, no one knew for how long to come; yet here we were now cleaving the free ocean under full sail on our way home. Such is life in the Arctic Seas, ever changing, often for the worse, but often for the better too.

Once more the sea, the blue sea lay all round. The air was saturated with sunshine, and fleecy white clouds went sailing high over head across the blue sky. The fresh blue seas came rolling after us on the port quarter, topped with creaming white crests. All our sails were full, and the propeller astern revolved untiringly. We were sweeping along eastward at nine or ten knots. And over a thousand miles of blue ocean still separated us from Norway.

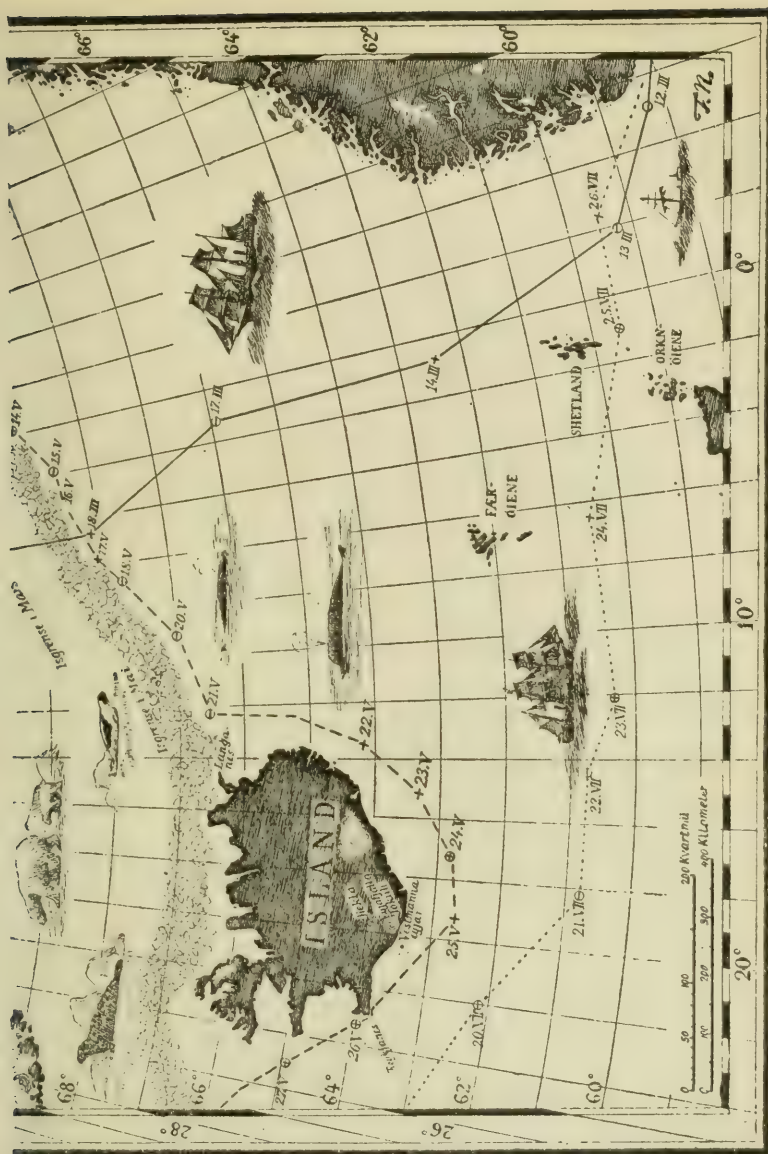
The sky above the horizon behind us in the north-east would still be of the same pale whitish hue from the sheen of the ice. How far away it seemed! But the life in the ice, the hunting, the thrills, the toils, and the hazards—all these already seemed farther away still. Very soon this voyage would become a thing of the past, and before long the lads would be signing on for another—at all events when all their money had been squandered in riotous living ashore.

Late on into the evening we sat for'ard on the fo'c'sle looking out over the sea and yarning about all that may happen in the Arctic Ocean when the luck's against you. A burnished copper sun was sinking through a bank of cloud into the sea, and a few golden rifts streaked the orange sky above.

The sun dipped lower beneath the ocean; over the bank of clouds in the north spread a ruddy glow; already the nights seemed darker here in the south. There was a stiff breeze, and it was growing fresher; perhaps we should have a gale towards morning; but the sails were left as they were.



The voyage of the "Viking."



The voyage of the "Viking."

A glass of grog was served out amid general rejoicings to every man on board, and we drank to a sailor's life at sea and up in the ice. Then the captain burst into song:—

Soon I'll have forded the Stygian creek,
What awaits me there no man can tell.
But all that I know and all that I care
Is that love, joy, and song are awaiting me here!

It was pretty late before we turned in; and I was pleasantly lulled to sleep by the sound of the sea as it lapped and gurgled and gushed along the side of the ship.

On *Thursday, July 25th* we passed Fair Isle, between the Shetlands and the Orkneys. This was the first land we sighted.

On the following evening mountains began to show above the sea to the east of us. Norway at last! What a thrill of joy that first glimpse gave one. We were nearly home now. . . . Surely the mountains of Norway are lovelier than all others, especially as they rise thus out of the sea.

Now we were drawing near to the south coast, with its islets and skerries, and the little houses nestling beneath luxuriant foliage, their smoke ascending peacefully into the air. See the patches of green field, the brown and white cows, and farther inland, ridge upon ridge of forest-clad hills. What a glorious country!

Now we were sailing in once more past Torungene. Country houses with rich gardens, boat-houses, and

little landing-stages, smiled down upon the fairway. Holiday-makers and women in light dresses stood about in the sunshine of a perfect summer morning.

And now the anchor dropped with a rattle in the port of Arendal; the "Viking" had completed her first voyage to the Arctic Ocean.

But Arendal had yet to learn what it meant to have a crew of sailor-lads back from a long voyage in the Arctic. When our sixty men, set foot on shore again after having been away for half a year, they set to work to make up for lost time, and that evening they fairly painted the town red.

The chief constable, Krefting and I had been having supper at the club, and when we came away late in the evening we heard a tremendous noise and blood-curdling yells down by the quays. Guessing what it was, we set off thither at a run. On the way we met a policeman running up the street as fast as his legs would carry him. When we got down to the harbor we saw our men engaged in a hand to hand fight with the police; having surrounded one of the policemen they were about to throw him into the sea. The captain and I ran in among them, and on seeing us they quieted down.

The fact was that these sealing crews were accustomed to being allowed a good deal of licence at the ports of Tönsberg and Sandefjord, on their arrival home from the Arctic Ocean. The police there kept discreetly out of the way, and allowed the lads to indulge in various excesses, so long as they did not carry them too far.

Now the Arendal police were not accustomed to this sort of thing; they wanted to maintain law and order, and intervened as soon as they saw that irregularities were being committed. This exasperated the sailors, who retaliated upon the police. The chief constable soon recognized that his little force of police could do nothing against this unruly crowd, who would simply have to rage themselves out.

A certain amount of parleying and persuasion followed, and Krefting endeavored to make our men see the desirability of returning quietly on board, to which they gradually agreed with a fairly good grace. While we were talking to them Peter Holmestranding addressed the chief constable:

"Look here Mr. Chief Constable, I'll tell you something. I've seen Nansen sprinting after a polar bear up there in the Arctic. Well, *he* sprinted jolly fast, but s'welp me if he went half as nippy as your policemen! Why, all we could see of *them* was their stern and hind-flippers disappearing up the street!"

What good-natured fellows our Norwegian sailor-lads are at bottom, when they are the right sort! Living with them both in storm and stress and in fine weather one learns to appreciate their warm-heartedness; nowhere could you find a more staunch and unselfish comrade—he will give you the very shirt off his back if you need it, and will gladly risk his life for you if you are in danger. But if they get excited and begin to run amuck, there is no knowing where they will stop; though even then their latent sense of humor is

always ready to flash out like lightning from the thunder-cloud.

We had shared the rough and tumble of life during those months in the Arctic, and now we parted to go on our several ways across the unstable sea of life, with all its ups and downs. Next spring would doubtless see most of them once more sailing the Arctic Ocean. But we never met again, and I have little idea of what became of them. I subsequently heard that Ola Maagerud took to shooting bigger game: he became a highly expert harpooner in the whale fishery. For



The "Viking" in the ice in Denmark Strait.

a time he was in the employ of old Castberg, who had a whaling company at Vardö, and became quite a well-to-do man. Of my friend the "Balloon" I never heard any more.

It was quite a wrench to part from Krefting. He wrote me a letter that autumn from Hamburg, where he was discharging the "Viking's" cargo of train-oil.

He said it seemed lonely and deserted on board, and that I must "go with him again to Greenland to visit our friends the 'Pomuchelskopper' ", adding "it was splendid up there: we lived a merry life and one after our own heart"—which was perfectly true.

He formed a company and built a new, still larger and more powerful ship, the "Sterkodder." As master of this vessel he made a voyage to the Arctic Ocean in 1884. On that occasion he sailed still nearer to the coast of Greenland, and caught a large number of bladernoses.

By this time he had married, and owned a fine farm with tillage and forest and game, just as we had planned it all when we were up north in the ice. So he gave up the life in the Arctic and settled down on his farm. But he was not destined to enjoy his good fortune for long. Attacked by an insidious disease, he died in September, 1886. He was a staunch, gallant fellow, an efficient, fearless Norwegian seaman and Arctic voyager, and a good friend.

THE END

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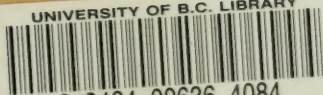
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